ROBUR®
caring for the environment

Installation, user and maintenance manual

AY Condensing line, AY Series

4 star condensation boiler
for heating

gas fired

Revisione: J
Codice: D-LBR531

This manual has been drawn up and printed by Robur S.p.A.; whole or partial reproduction of this manual is prohibited.

The original is filed at Robur S.p.A.

Any use of this manual other than for personal consultation must be previously authorised by Robur S.p.A.

The rights of those who have legitimately filed the registered trademarks contained within this publication are not affected.

With the aim of continuously improving the quality of its products, Robur S.p.A. reserves the right to modify the data and contents of this manual without prior notice.

INDEX OF CONTENTS

1 PREFACE 4

2 SAFETY WARNINGS 5

3 OVERVIEW AND TECHNICAL FEATURES 7

3.1 GENERAL INFORMATION 7
3.2 OVERVIEW OF OPERATION 8
3.3 TECHNICAL MANUFACTURING CHARACTERISTICS 9
3.4 TECHNICAL DATA 9
3.5 DIMENSIONS AND SERVICE PANEL 11

4 NORMAL OPERATION 13

4.1 START UP (AND SHUT DOWN) 13
4.2 ON-BOARD ELECTRONICS 14
4.3 RESET OPERATIONS 15
4.4 OPERATING SETTINGS 16
4.5 PROLONGED PERIODS OF DISUSE 17

5 HYDRAULIC INSTALLATION 18

5.1 GENERAL INSTALLATION PRINCIPLES 18
5.2 POSITION OF THE APPLIANCE 18
5.3 HYDRAULIC CONNECTIONS 19
5.4 GAS SUPPLY 23
5.5 CONDENSATE DISCHARGE 24
5.6 FILLING THE SYSTEM CIRCUIT (APPLIANCE) 25
5.7 FILLING THE APPLIANCE'S INTERNAL CIRCUIT 25
5.8 EXHAUST FLUE GAS 26
5.9 PROGRAMMING OF HYDRAULIC PARAMETERS 29

6 ELECTRICAL INSTALLATION 32

6.1 CONNECTING THE APPLIANCE TO THE MAINS 34
6.2 ELECTRICAL CONNECTIONS FOR THE SYSTEM CIRCULATOR 36
6.3 CONNECTIONS FOR CONSENT SWITCH OPERATION 39
6.4 USE OF THE CCI/DDC 40

7 INITIAL ACTIVATION AND MAINTENANCE 50

7.1 PROCEDURE FOR FIRST START UP 50
7.2 MAINTENANCE 53
7.3 CHANGE OF GAS TYPE 54

8 ACCESSORIES 58

9 OPERATING CODES/TROUBLESHOOTING 59

9.1 OVERVIEW AND OPERATING CODES/TROUBLESHOOTING 59

1 PREFACE

This "Installation, user and maintenance manual" is a guide to the installation and operation of the *AY Condensing Line base-mounted gas boiler.*

In particular, the manual deals with the AY00-120 model, hereinafter called "appliance", of the *AY Series*, and is intended for use by:

- final users for the operation of the appliance according to their own requirements;
- installation technicians (hydraulic and electrical) for the carrying out of a correct installation of the appliance and of the Direct Digital Controller (DDC).

The manual also contains:

- a section that describes all the operations necessary for the "first start-up" and for the "gas change" of the appliance, as well as the main maintenance operations;
- an "ACCESSORIES" section with a description of accessories available and their respective reference codes;
- (IN CASE) one or more APPENDIX sections in which are reported some "specific" information for a particular country.

Definitions, meaning of terms and icons

APPLIANCE: 4 star condensation boiler, Robur model "AY00-120".
CCI: "Comfort Control Interface" device. Not applicable.
DDC: digital control panel (Direct Digital Controller).
TAC: Technical Assistance Centre (authorised by Robur S.p.A.).
ACS: sanitary (domestic) hot water.
UTA: air handler.
The **icons** used in the manual have the following meanings:

= DANGER

= WARNING

= NOTE

= START OF OPERATING PROCEDURE

= REFERENCE to another part of the manual or other document

2 SAFETY WARNINGS

Packing items (plastic bags, polystyrene foam, nails, etc.) must be kept out of the reach of children, as they are potentially dangerous.

The appliance must only be used for the purposes for which it has been designed. Any other use is considered inappropriate and therefore dangerous. The manufacturer does not accept any contractual or extra-contractual liability for any damage caused by improper use of the appliance.

Frequent topping up of the hydraulic with water can result in damage due to scale and corrosion, depending on the quality of the water being used. Make sure the system is water tight and that the expansion tank is operational.

Concentrations of chlorides or free chlorine in the circuit above the values given in Table 5.1 → 19 will damage the unit's water/ammonia exchanger.

Close the gas supply before working on the gas circuit. On completing work on the gas circuit, check for leakages as required by established regulations.

Do not operate the appliance if dangerous conditions exist: odour of gas in the grid or near the appliance; problems with the electrical/gas grid or hydraulic circuit; parts of the appliance submerged in water or otherwise damaged; controls or safety components bypassed or defective. In these cases, ask for assistance to professionally qualified personnel.

If you smell gas:

- ► do not use electrical devices such as telephones, multimeters or other equipment that can cause sparks next to the appliance;
- ► shut off gas supply closing the isolation valve;
- ► cut off electrical power opening the main breaker upstream of the appliance (to be provided by the electrical installer in an appropriate panel);
- ► ask for assistance to professionally qualified personnel from a telephone distant from the appliance.

Moving parts, also during the appliance's start-up and shut-down cycles. Do not remove guards. Make sure the appliance cannot be started up inadvertently.

POISONING HAZARD

Make sure the flue gas components are tight and compliant with established regulations. After any intervention on these parts, check for tightness.

BURN HAZARD

The appliance contains numerous hot parts. Do not open up the appliance or touch the fumes outlet pipe. If necessary, contact your Technical Assistance Centre.

ELECTROCUTION HAZARD

- ► Use only approved components for the electrical connections, as specified by the manufacturer.
- ► Disconnect the electrical power supply before working on the appliance's internal electrical equipment (electrical panel, motors, control board, etc.).
- ► Make sure the appliance cannot be started up inadvertently.

The electrical safety of the appliance is ensured only when it is correctly connected to an efficient grounding system, compilant with current safety regulations.

DAMAGE DUE TO AGGRESSIVE SUBSTANCES IN THE AIR SUPPLY

Hydrogenated hydrocarbons, which contain chlorine and fluorine compounds, will increase the corrosion of the unit.
Make sure the air supply is free of aggressive substances.

ACID CONDENSATE

Drain out the condensate produced during combustion as indicated in paragraph 5.5 → 24.

EXPLOSIVE/FLAMMABLE MATERIALS HAZARD

Do not use or store flammable materials (paper, solvents, paint, etc.) in the vicinity of the appliance.

SUGGESTIONS FOR THE CLIENT

Stipulate a maintenance contract with an authorised specialist contractor for the annual inspection of the appliance and maintenance when needed.
Maintenance and repairs may only be done a contractor legally authorised to work on gas appliances and equipment.
Only accept and use original spare parts.

3 OVERVIEW AND TECHNICAL FEATURES

In this section you will find general information, hints on the operating principle of the appliance and its manufacturing features. This section also contains technical data and dimensional drawings of the appliance.

3.1 GENERAL INFORMATION

This manual is an integral and essential part of the product and must be delivered to the user together with the appliance.

Conformity to CE standards

The appliance is CE certified and conforms with all essential requirements of:

- Gas Directive 90/396/EEC and subsequent modifications and additions.
- Efficiency Directive 92/42/EEC and subsequent modifications and additions.
- Electromagnetic Compatibility Directive 89/336/EEC and subsequent modifications and additions.
- Low Voltage Directive 89/336/EEC and subsequent modifications and additions.
- Machinery Directive 2006/42/EC.
- UNI EN 677 Specific requirements for condensing boilers with nominal thermal capacity up to 70 kW.
- UNI EN 483 Type C boilers with nominal thermal capacity no greater than 70 kW.

Information regarding the above EC certifications is given in Paragraph 3.4 → 9, as well as on the *Nameplate* of the appliance itself.

Installation and regulatory references

When the appliance arrives at the installation site, before beginning the stages required to move it in order to position it on the site, perform a visual check to ascertain that there are no evident signs of breakage or damage to the packaging or to the external panels, which would be signs that damage occurred during transport.

Packing materials must be removed only after the appliance has been positioned on site. After removing the packing materials, ensure that the appliance is intact and complete.

Installation of the appliance may only be carried out by professionally qualified personnel by i.e. firms qualified according to the current legislation of the country of installation.

"Professionally qualified personnel" means personnel with specific technical competence in the sector of heating/cooling installations and gas appliances.

Installation of the appliance must be carried out in compliance with current local and national regulations regarding the design, installation and maintenance of heating and cooling installations and in accordance with the manufacturer's instructions.
In particular, current regulations regarding the following must be observed:

- Gas equipment.
- Electrical equipment.
- Heating systems employing condensation boilers.
- Every other standard and regulation concerning the installation of equipment for summer and winter air conditioning using gas fuel.

The manufacturer does not accept any contractual or extra-contractual liability for any damage caused by errors in installation and/or failure to observe the abovementioned regulations and the instructions supplied by the manufacturer itself.

Once the appliance is installed

The installer must provide the owner with a Declaration stating that the installation has been completed in compliance with state-of-the-art practices, current national and local regulations, and recommendations by the manufacturer.

Before contacting your authorised Robur Technical Assistance Centre (TAC) for the *initial activation*, the firm must ensure that:

- the electricity and gas mains specifications correspond to the specifications on the *nameplate*;
- the gas supply pressure is compliant with the value reported in Table 5.2 → 24 (considering a tolerance of ±15%);
- the appliance is fed by the type of gas for which it is designed;
- the gas supply system and water distribution system are sealed;
- the gas and electricity supply systems are properly rated for the capacity required by the appliance and are equipped with all safety and control devices required by current regulations

Check that no safety and control devices are excluded, by-passed or not properly working.

Initial activation procedure

The complete procedure for the first start up of the appliance must be carried out by an authorized technician according to the instructions supplied by the manufacturer.
To carry out entire procedure correctly, follow the instructions in Paragraph 7.1 → 50.

Warranty could be invalidated if the *first start up* is not carried out and validated by an authorized technician.

Operation and maintenance of the appliance

To ensure the correct operation of the appliance and to avoid failures, control of the switching on and off of the appliance must be carried out exclusively via a switch located on the on/off command circuit.
If the appliance is to be connected to a Direct Digital Controller (DDC, available as an accessory), control of activating and deactivating the appliance must be performed exclusively through the DDC itself.

The appliance must never normally be switched on and off by shutting off the power supply upstream of the on/off commands (DDC or other switch) before having operated these first. With the appliance running, also wait for the shutdown cycle to end (approximately 3 minutes) before shutting off the power supply power.

If the appliance fails to operate correctly, with the consequent indication of the Machine code, follow the instructions of Paragraph 9.1 → 59.

In the event of failure of the appliance and/or breakage of any component, do not attempt to repair and/or restore operation; proceed as follows:

- deactivate the appliance immediately (if permitted and if no condition of danger exists) by starting the shutdown cycle via the on/off command (or DDC) and waiting for it to terminate (approximately 3 minutes);
- disconnect the appliance from the gas and electricity mains, cutting off gas supply by means of the appropriate valve and the power supply by means of the external circuit breaker provided by the electrical system installation technician on the appropriate panel;
- contact your local Robur TAC.

If it is decided not to use the appliance for a prolonged period, disconnect the appliance following the instructions provided in Paragraph 4.5 → 17.
Proper **ordinary maintenance** ensures the efficiency and good operation of the appliance over time.
Carry out maintenance operations according to the instructions supplied by the manufacturer (see Paragraph 7.2 → 53).
For maintenance of the appliance's internal components, contact a Robur TAC or qualified technician; for other maintenance requirements, see Paragraph 7.2 → 53.
Any repair of the appliance must be carried out by Technical Assistance, using only original spare parts.

Failure to observe the indications given above may compromise the *operation* and *safety* of the appliance, and may invalidate its guarantee, if active.

If the appliance is to be disposed of, contact the manufacturer for its correct disposal.

If the appliance is to be sold or transferred to another owner, ensure that this "Installation, user and maintenance manual" is handed over to the new owner and installer.

3.2 OVERVIEW OF OPERATION

The appliance powered by 230 V 1N 50 Hz electrical power - .
During operation, combustion products are exhausted via the discharge terminal, with vertical outlet, at the top of the appliance.
Combustion product condensate is discharged via the special pipe which passes through the service plate (see Figure 3.3 → 12).
The appliance is equipped with a plate exchanger which separates the following hydraulic circuits:

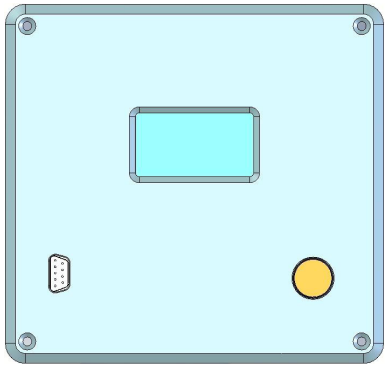
- the **internal circuit** dedicated to the combustion unit and factory charged to enable storage down to -30°C;
- the **system circuit**. The section of circuit running from the exchanger to the hydraulic unions on the service plate is itself a part of the system circuit.

Control and management of operation of the appliance occurs via the on-board electronics through the microprocessor control board (see Figure 4.1 → 14).
Control and management of operation of the appliance may also take place via the Direct Digital Controller (see Figure 3.1 → 9) available as an accessory.

For instructions regarding the use, configuration and programming of the DDC, refer to the two manuals supplied with the unit.

DDC configuration/programming operations must be carried out by an authorised Robur Technical Assistance Centre (TAC) during initial activation procedures and according to the instructions supplied by the manufacturer.

Figure 3.1 – CCI/DDC



AY00-120: description and general characteristics

the appliance (see Figure 3.2 → 11) is a B53P type high efficiency boiler (star efficiency class as per Directive 92/42/CEE).
The appliance is a Range Rated boiler: the power delivery of the appliance can be adapted to the real system requirements by regulating the nominal gas flow (nominal thermal input).
The appliance, which can produce hot water up to 80°C, is suited to installation in all hot water production systems for heating, sanitary use (ACS), process needs, air handlers, etc. Since the appliance is of the 2 pipe variety (water inlet and outlet), it can be adapted to a variety of purposes (e.g.: both heating and ACS) by bleeding the system.

3.3 TECHNICAL MANUFACTURING CHARACTERISTICS

The appliance is supplied with the following technical manufacturing characteristics, control and safety components:

- premixed multigas burner with low NO_X and CO emissions;
- stainless steel plate exchanger, acting as a hydraulic separator;
- AY10 microprocessor controller with LCD display and control knob (Figure 4.1 → 14);
- S70 controller (Figure 4.1 → 14);
- ionisation-based flame controller;
- gas solenoid valve with double shutter;
- system water antifreeze function;
- internal circuit antifreeze function;
- automatically resettable water temperature limiting thermostat;
- single-use fumes limiting thermostat (thermal cutout);
- system circuit water differential pressure switch (PD1);
- internal circuit water differential pressure switch (PD2) with anti-sticking function;
- overpressure valve on internal circuit, set to trip at 3 bar;
- internal circuit expansion tank;
- automatic and manual air bleeds on the internal circuit;
- fumes pipe with terminal, for type B53P configuration.
- condensate discharge siphon (with antifreeze function);
- anti-freezing thermostat used for the activation of the heating element on the condensate drain.

3.4 TECHNICAL DATA

Table 3.1 – TECHNICAL CHARACTERISTICS

			AY00-120
OPERATION WHEN HEATING			
Thermal capacity	Nominal (1013 mbar - 15°C)	kW	34,9
	MEAN	kW	21.5
	MIN	kW	8.0
OPERATING POINT: Tm80/Tr60 and nominal thermal capacity	Available power	kW	34.4
	Efficiency	%	98.6
OPERATING POINT: Tm80/Tr60 and minimal thermal capacity	Efficiency	%	97.3
OPERATING POINT: Tm70/Tr50 and nominal thermal capacity	Efficiency	%	100,6
Efficiency classes			****

			AY00-120
NOx emission class			5
Hot water delivery temperature	maximum	°C	80
	minimum	°C	25
	nominal	°C	60
Hot water return temperature	maximum	°C	70
	minimum	°C	20
	nominal	°C	50
Hot water flow rate	nominal	l/h	2950
	maximum	l/h	3200
	minimum	l/h	1500
Hot water pressure drop	at nominal water flow	bar	0,395
Ambient air temperature (dry bulb)	maximum	°C	45
	minimum	°C	-20
gas consumption	methane G20 (nominal)	m3/h	3.69
	methane G20 (MIN)	m3/h	0.85
	G25 (nominal)	m3/h	4,35
	G25 (MIN)	m3/h	1,00
	G30 (nominal)	kg/h	2.75
	G30 (MIN)	kg/h	0.63
	G31 (nominal)	kg/h	2.71
	G31 (MIN)	kg/h	0.62
THERMAL EFFICIENCIES			
Efficiency at MEAN thermal capacity Tm80/Tr60		%	98.3
Efficiency at MIN thermal capacity Tm80/Tr60		%	97.3
Efficiency at nominal thermal capacity Tm50/Tr30		%	104.6
Efficiency at 30% of nominal thermal capacity Tr=30°C		%	107.5
Efficiency at 30% of nominal thermal capacity Tr=47°C		%	100.3
Operational heat loss to jacket		kW	0,15
Operational heat loss to jacket		%	0.44
Operational heat loss to flue		kW	0,86
Operational heat loss to flue		%	2.54
Heat loss in off mode		kW	0,058
Heat loss in off mode		%	0,2
ELECTRICAL SPECIFICATIONS			
Power supply	Voltage	V	230
	TYPE		single-phase
	Frequency	50 Hz supply	50
Electrical power absorption	nominal	kW	0.185
Degree of protection	IP		X5D
INSTALLATION DATA			
Minimum storage temperature		°C	-30
Maximum operating pressure		bar	3
Water content inside the apparatus	HOT SIDE	l	1,0
Water fitting	TYPE		F
	thread	" G	1 1/4
Gas fitting	TYPE		M
	thread	" G	3/4
Fume outlet	Type of installation		B23P-B33-B53P-C13-C33-C43-C53-C63-C83
	Diameter ( )	mm	80
	Residual head	Pa	100
	Product configuration		B53P
Size	width	mm	410
	height	mm	1280
	depth	mm	530
Weight	In operation	kg	71

AY00-120 operational and installation technical characteristics.

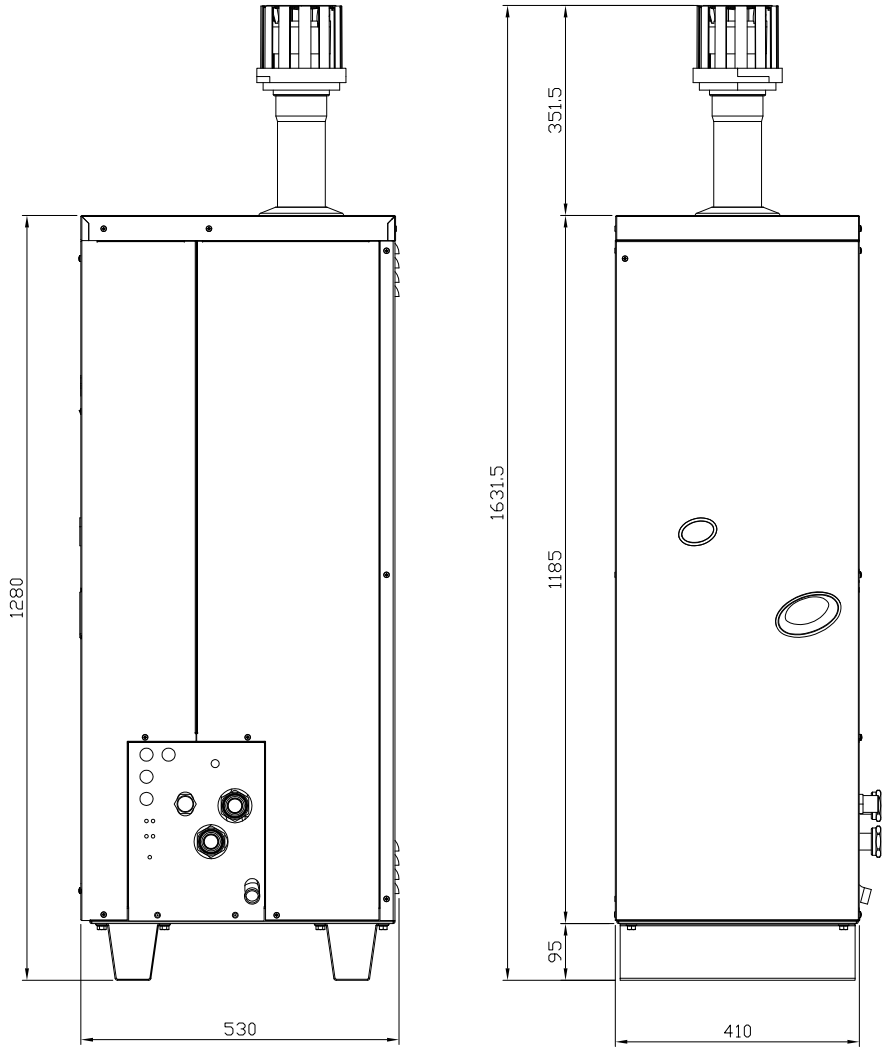
Table 3.2 – Table of pressure drop of a single unit - AY serie

PRESSURE DROP OF A SINGLE AY00-120 CONDENSING UNIT	
Water flow rate	**WATER TEMPERATURE**
	20°C
[l/h]	**[bar]**
1008	0,066
1198	0,085
1398	0,106

PRESSURE DROP OF A SINGLE AY00-120 CONDENSING UNIT	
Water flow rate	WATER TEMPERATURE
	20°C
[l/h]	[bar]
1608	0,136
1801	0,165
2007	0,204
2199	0,234
2400	0,269
2601	0,312
2797	0,353
2958	0,395
3000	0,406
3201	0,469

3.5 DIMENSIONS AND SERVICE PANEL

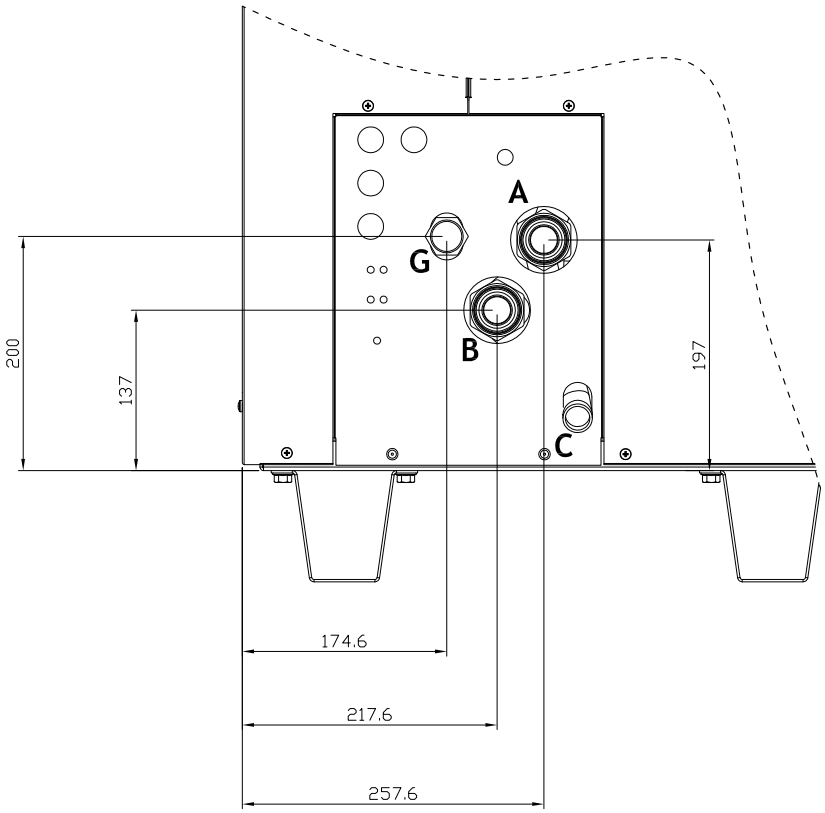
Figure 3.2 – Dimensional drawing of model AY00-120



LEGEND
Series AY model AY00-120

AY00-120 - front and RH side views (dimensions in mm).

Figure 3.3 – SERVICE PANEL: Series AY - AY Condensing line



LEGEND

G	gas fitting ("G 3/4 M)
A	outlet water fitting ("G 1 1/4 F)
B	inlet water fitting ("G 1 1/4 F)
C	condensate drain fitting (ext. dia. 25 mm)

Series AY - service plate (dimensions in mm).

4 NORMAL OPERATION

In this section you will find all the indications necessary for the activation, regulation and control of operation of the appliance via the controller present in the electrical panel.

4.1 START UP (AND SHUT DOWN)

Efficient operation and long life of the appliance depend largely on its correct use!

Before activating the appliance, check that:

- the gas valve is open;
- the appliance is powered electrically: the general electrical switch (GS) must be in the «ON» position;
- the installation technician has ensured that the hydraulic circuit is supplied in the correct conditions.

If these conditions are satisfied, it is possible to proceed with activation.
If the appliance is not connected to a DDC, it may be activated and deactivated only by means of the **on/off command** provided by the electrical installation technician.
According to requirements, this on/off command may be an on/off button, an ambient thermostat, a programmable timer, or one or more voltage free contacts controlled by another process.

For details about the type of on/off command installed, contact the plant's electrical installation technician.

Start up
Switch on the appliance by means of the on/off command (placing it in the "ON" position).
Shut down
Switch off the appliance via the on/off command (placing it in the "OFF" position).

The shutdown cycle takes approximately 3 minutes to complete.

The on/off command is essential! Do not switch the appliance on or off by connecting it to or disconnecting it from the power supply directly, as this may be a source of danger and in any case damage the appliance or the plants connected to it.

If the appliance is connected to a DDC running in controller mode, the appliance is started up and controlled exclusively by the DDC.

For instructions regarding the use of the DDC, refer to the two manuals supplied with it, and in particular: "Final user manual - manual 2"

Visualising and clearing of operating codes

Operating codes can be generated by the controller or by the DDC.
The operating codes generated by the controller are visualised on its display and may also be visualised on the display of the DDC (if fitted).
Operating codes generated by the controller can be reset with the controller itself or from the DDC (if fitted or where possible).

For a description of the operating codes generated by the electronic board and how to reset them, refer to the list of operating codes contained in Table 9.1 → 59.

The controller (see Figure 4.1 → 14) is located inside the electrical panel of the appliance and the display may be viewed through the viewing hole on the front panel of the unit itself.

The Machine Codes generated by the DDC may only be viewed on the display of the DDC and may be cleared only through the DDC.

Operating codes generated by the electronic board during the start-up of the appliance

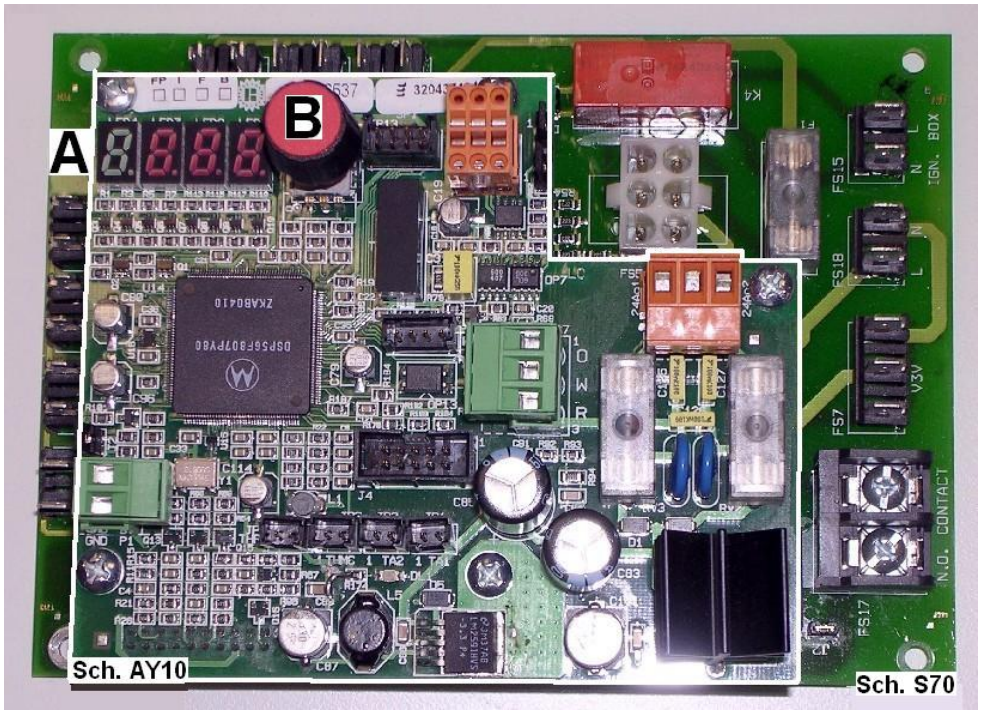
If the appliance remains inactive for a prolonged period, it is possible that air is present in the gas pipes. In this case, activation fails and the appliance reports the operating code: "u_12" - flame controller arrest (temporary) (see Paragraph 9.1 → 59) and after a brief interval the appliance automatically launches the start up procedure again.
If code (u_12) is signalled 4 times on successive activation attempts, the code persists, the appliance locks out the flame controller and displays the following operating code: "E_12" – flame controller arrest (see Paragraph 9.1 → 59). In this case reset is not automatic. To restore operation of the appliance, carry out a reset of the flame control unit via menu 2 of the controller: the procedure is illustrated in Paragraph 4.3 → 15. After it is reset, the appliance will make a new attempt to activate.
If the appliance locks out several times, contact a Robur TAC by calling the *Technical Service Department* of Robur S.p.A. (tel. +39.035.888111).
When activation is successful, the appliance is managed by the on-board controller (see following paragraph).

4.2 ON-BOARD ELECTRONICS

The following descriptions refer to the controller with firmware version 3.106.

The appliance is fitted with an *AY10* controller connected to an auxiliary *S70* controller (see Figure 4.1 → 14). The *AY10* is installed over the S70 and is located in the machine's internal electrical panel.
The AY10 controller controls the appliance and displays data, messages and codes during operation. Programming, control and monitoring of the appliance take place by interacting with the display and encoder of the controller. The CAN BUS port connects one or several appliances to a DDC.

Figure 4.1 – On-board electronics



LEGEND

A	4 digit display for data and operating codes.
B	Knob for scrolling through/ selecting operating data

Controllers AY10 and S70.

Description of menu of AY10 controller

The parameters and settings of the appliance are grouped in the menus shown on the controller's display:

Table 4.1 – Menu of electronic board

MENU	MENU DESCRIPTION	THE DISPLAY SHOWS
Menu 0	VIEW DATA (TEMPERATURE, VOLTAGE, PUMP SPEED, ECC...)	0.
Menu 1	VIEW ALL PARAMETERS	1.
Menu 2	ENTER ACTIONS	2.
Menu 3	USER SETTINGS (THERMOSTATING, SET-POINT, T. DIFFERENTIAL)	3.
Menu 4	INSTALLATION TECHNICIAN SETTINGS	4.
Menu 5	TECHNICAL ASSISTANCE CENTRE SETTINGS	5.
Menu 6	TECHNICAL ASSISTANCE CENTRE SETTINGS (MACHINE TYPE)	6.
Menu 7	VIEW DIGITAL IMPUTS	7.
Menu 8	(MENU NOT USED)	8.
E	EXIT MENU	E.

Menu list of electronic board

Menus 0, 1 and 7 are Viewing Menus: they only allow the information displayed to be read, and not modified. Menu 0 shows the appliance operating data in real time. Menu 1 shows the parameters that characterise the operation of the appliance and their current values.

Menu 7 is to be used ONLY by the Robur TAC.

To view the information contained in these menus, proceed as illustrated in the procedure explained below: HOW TO ACCESS THE MENUS.
Menu 2 is an Action Menu: it is used to reset the flame controller and errors.
To perform these procedures, see Paragraph 4.3 → 15.
Menu 3 is a Settings Menu: it allows the values displayed to be set. The correct values of these parameters, for optimum performance of the appliance with the plant to be used connected, have already been set during installation. To set new values for the parameters, see Paragraph 5.9 → 29.

Menus 4, 5, 6 and 7 exclusively concern the installation technician and Robur's authorized Technical Assistance Centre.
Menu 8 may currently be selected, but not used.

Display and knob

The controller's display can be viewed through the glass of the viewing aperture on the front panel of the appliance.
Upon activation, all display's LED's light up, and then the name of the controller displays. Subsequently (if the on/off command switch is set to ON), the appliance begins to operate.
During correct operation the display shows, alternately, the following information: outlet water temperature, inlet water temperature, and the difference between the two water temperatures (see Table 4.2 → 15).

Table 4.2 – Operating information

OPERATING MODE: HEATING	
PARAMETER	**THE DISPLAY SHOWS**
Hot outlet water temperature	50.0
Hot inlet water temperature	40.0
Differential Temperature (outlet - inlet)	10.0

Example of data visualised on display: water temperature and differential

If there are operating problems, the display shows, sequentially, the operating codes corresponding to the problem detected. A list of these codes with their description and the procedure to follow to bring the appliance back to correct operation is provided in Paragraph 9.1 → 59.
The knob is used to display or set parameters, or to execute actions/commands (e.g.: a function or reset), when permitted.

HOW TO ACCESS THE MENUS

► To use the knob with the special key supplied with the appliance:

You will need: the appliance's electrical power switches set to "ON"; the controller's display sequentially shows the operating data (temperature, delta T) regarding the current mode (e.g.: heating) and any active operating codes ("u/E...").

1. Remove the front panel by removing the fixing screws.
2. Remove the cover of the electrical panel to access the knob.
3. Use the special key through the hole to operate the knob and access the controller's menus and parameters.
4. To display the menus just press the knob once: the display shows the first menu: "0." (= menu 0).
5. The display shows "0.". To display the other menus, turn the knob clockwise; The display will read, in order: "1.", "2.", "3.", "4.", "5.", "6.", "7.", "8." and "E" (see 4.1 → 14).
6. To display the parameters in a given menu (for example, menu 0), turn the knob until it displays the menu in question (in the example: "0.") and press the knob: the display will show the first of the menu's parameters, in this example "0.0" or "0.40" (= menu 0, parameter "0" or "40").
7. In the same way: **turn** the knob to scroll through content (menus, parameters, actions), **press** the knob to select/confirm the content (access a menu, display/set a parameter, execute an action, quit or return to the previous level). For example, to quit the menus, turn the knob to scroll through menus "0.", "1.", "2." etc. until the controller displays the quit screen "E"; now press the knob to quit.

In the case of menus 0 and 1, the user can view any parameter. For how to access to menu 2, refer to Paragraph 4.3 → 15. To set the parameters of menu 3, refer to Paragraph 5.9 → 29. The other menus are not for the User: the information in these menus is dealt with in the sections dedicated to the installation technician or Robur TAC.

The special key allows the knob of the electronic board to be operated without opening the cover of the electrical panel, so that operators are protected from live components. When the necessary settings have been completed, put away the special key, replace the cap on the aperture of the electrical panel and refit the front panel of the appliance.

4.3 RESET OPERATIONS

Table 4.3 → 15 shows the actions available in menu 2.

Table 4.3 – Menu 2 of the AY10 controller

ACTION	REQUIRED FOR EXECUTION	SHOWN ON DISPLAY AS
20	Reset flame controller arrest	2. 20
21	Reset other operating codes	2. 21
23	Timed forcing to minimum power	2. 23
24	Timed forcing to maximum power	2. 24
25	Stop power forcing	2. 25
E	(EXIT MENU)	2. E

Menu 2 actions.

The general operating codes of the controller can be reset with functions "20" and "21" or via the DDC, if running in controller mode. These operations can be run by the TAC and (some of them) by the user, as indicated in Table 9.1 → 59. When the DDC is running in controller mode, these operations can be run only with the DDC itself.

► To access menu 2:

You will need: the controller display shows the operating data (temperatures, delta T°, etc.) or operating codes ("u/E...") corresponding to the signal in question (u/E..) in sequence.

1. See procedure "HOW TO ACCESS THE MENUS" (Paragraph 4.2 → 14) and proceed as described in steps "1" to "5".
2. The display will now flash "0.". Turn the knob until menu 2 displays: the display shows "2".
3. Press the knob to access menu 2: the display shows the first of its actions "2.0" or "2.20" (= menu 2, action "0" or "20"). Turn the knob to scroll through the other actions."

The user must now only run the action relating to the command indicated in the operating code description in TABLE 9.1 → 59. Two commands are available: "reset flame controller" (action "20") or "reset other codes" (action "21").

Actions "23", "24" and "25" are used to regulate the combustion parameters or for gas type changeovers, and are thus for use only by the installation technician or Robur TAC.

Reset flame controller (parameter "20"):

You will need: the display reads "2.20" (as per step "3").

1. Press the knob to display the flashing reset request: "reS1".
2. Press the knob again to reset the flame controller. The reset request stops flashing, and the display shows "2.20" again. The reset operation has been performed.
3. To exit the menu, turn the knob clockwise until "2.E" displays, and press it to return to the menu selection: "2.".
4. To exit the menu selection, turn the knob clockwise until "E" displays, and press it to exit.

At this point, if the display does not signal any other operating codes, put away the special key, replace the electrical panel cover and refit the front panel.

Reset other operating codes (parameter "21"):

You will need: the display reads "2.20" (as per step "3").

1. Turn the knob clockwise until action "2.21" displays.
2. Press the knob to display the flashing reset request: "rEr1".
3. Press the knob again to reset the operating code. The reset request stops flashing, and the display shows "2.21" again. The reset operation has been performed.
4. To exit the menu, turn the knob clockwise until "2.E" displays, and press it to return to the menu selection: "2.".
5. To exit the menu selection, turn the knob clockwise until "E" displays, and press it to exit.

At this point, if the display does not signal any other operating codes, put away the special key, replace the electrical panel cover and refit the front panel.

4.4 OPERATING SETTINGS

At the moment of installation, the appliance is set up by the installation technician for best operation according to the type of plant installed. Subsequently it is possible to modify the operating parameters, but this is not recommended if not in possession of the necessary knowledge and experience required to ensure the appliance's performance.

The user modifiable parameters (only if the appliance is not controlled by a DDC) are those in menu 3 of the controller, as follows:

► parameter "160": thermostat control.

► parameter "161": setpoint.

► parameter "162": differential.

These are hydraulic parameters and expert knowledge is required to set them.

To modify these parameters, refer to Paragraph 5.9 → 29.

If the appliance is connected to a DDC, follow the instructions given in the DDC manuals exclusively.

4.5 PROLONGED PERIODS OF DISUSE

When the appliance is to be inactive for a long period, it is necessary to disconnect the appliance before the period of disuse and reconnect it before it is used again.
To carry out these operations, contact a reputable hydraulic system installation technician.

Disconnecting the appliance before the period of disuse

You will need: the appliance connected to the power/gas supply. Necessary equipment and materials.

1. if the appliance is in operation, switch it off with the DDC (or other consent switches) and wait for the shutdown cycle to terminate completely (approximately 3 minutes).
2. Close the gas cock (if compatible with the antifreeze functions) (Paragraphs 5.6 → 25 and 5.7 → 25).
3. Switch off the DDC (if present).
4. Disconnect the appliance from the mains (if compatible with antifreeze functions, Paragraphs 5.6 → 25 and 5.7 → 25), and set the external power switch in the electrical panel to "OFF" (GS - see Paragraph 6.1 → 34).

Do not leave the appliance connected to the power and gas supply if it is expected to remain inactive for a long period.

If the appliance is disconnected in the run up to winter, make sure that there is a sufficient glycol concentration in the internal and system circuits: see "Possible use of glycol antifreeze" and Table 5.3 → 25.

Connecting the appliance before it is used again (to be carried out by the installation technician)

Before starting this procedure, the hydraulic system installation technician must:

- Ascertain whether the appliance requires any maintenance (contact your authorised Robur Technical Assistance Centre or refer to Paragraph 7.2 → 53);
- check that the water content of the plant is correct; if necessary, top up the circuit to at least the minimum quantity (see Paragraph 5.6 → 25);
- if necessary, add inhibited monoethylene glycol antifreeze (free of impurities) in a quantity in proportion to the MINIMUM winter temperature in the area of installation (see Table 5.3 → 25);
- bring the plant to the correct pressure, making sure that the pressure of the water in the plant is not less than 1 bar and not over 2 bar.

In case of winter saesonal switch-off or long period of stopping, we suggest to not empty the hydraulic circuit: in that case possible oxidation process can occur.This oxidation process could damage both the hydraulic system and also the Robur heat pump.It's important to verify that no leakages occur in the hydraulic circuit that may empty part of the system. The above recommendation is necessary in order to avoid to fill continuously with water that may imply the additional introduction of oxygen and the consequent dilution of the used inhibitor, for ex glycol. In case of precence of glycol, Robur advices to use inhibited glycol. Galvanized pipes are not recommended, as they are not compatible with glycol.

You will need: the appliance disconnected from the electricity and gas supply. Necessary equipment and materials.

1. Open the gas supply tap to the plant and ascertain that there is no smell of gas (indicating possible leaks);

if you smell gas, close the gas valve again immediately without operating any other electrical device and, from a safe place, request the assistance of professionally qualified personnel.

1. If no smell of gas is detected, connect the appliance to the electricity supply mains via the external disconnecting switch provided by the installation technician in the appropriate panel (set the "GS" disconnecting switch to the "ON" position - see Paragraph 6.1 → 34).
2. Power up the DDC (if present).
3. Check that the hydraulic plant is suitably sized to guarantee the correct water flow.
4. Switch the appliance on with the DDC (or other consent switches).
5. Ascertain whether the appliance requires any maintenance (refer to Paragraph 7.2 → 53). In particular, check the operation of the condensate siphon.

Icing of condensate during the period of disuse can lead to a permanent locked condition. In this case, the first symptom would be a lack of condensate draining in condensation mode (outlet water temperature less than 50 °C).

5 HYDRAULIC INSTALLATION

In this section you will find all the instructions necessary for the hydraulic installation.

Before realizing hydraulic system and gas supply for the appliance, the professionally qualified personnel is advised to read Paragraph 3.1 → 7, providing important recommendations about safety and references to current regulations.

5.1 GENERAL INSTALLATION PRINCIPLES

Prior to installation, carry out careful internal cleaning of all pipes and every other component to be used both on the hydraulic plant and the fuel supply plant, in order to remove any residues that may compromise operation of the appliance.

Installation of the appliance must be carried out in compliance with current regulations regarding design, installation and maintenance of heating and cooling plants and must be undertaken by professionally qualified personnel in accordance with the manufacturer's instructions.
During the installation stage, observe the following indications:

- Check that there is an adequate mains gas supply, in accordance with the manufacturer's specifications; for the correct supply pressure, refer to Paragraph 5.4 → 23.
- The appliance may be installed both indoors and outdoors; in case of outdoors installation, the appliance must be located in an area in which air circulates naturally and which does not require any particular protection from the weather.
- No obstruction or overhanging structure (protruding roofs, eaves, balconies, ledges, trees) may obstruct the exhaust fumes outlet at the top of the appliance.
- Do not install the appliance, in configuration B, in the immediate vicinity of flue outlets, chimneys or other such features, so as to prevent warm or polluted air from being drawn in by the combustion fan. In order to function correctly the appliance must use clean air from the environment.
- If the appliance is installed near buildings, make sure it is not on the dripping line from gutters or similar.
- A cut-off valve and vibration damping coupling must be fitted on the gas supply.

5.2 POSITION OF THE APPLIANCE

Lifting the appliance and placing it in position

Do not remove packaging during handling on the installation site.

Packing must only be removed upon final installation.

When unpacking the appliance, do not remove the protective cap on the top panel as this can allow dirt and water to enter the interior of the appliance.

The appliance can be installed at ground level, or on a terrace or roof (if they are able to sustain its "dimensions" and "weight"). **The appliance must be installed in an area which is always accessible.**

The dimensions and weight of the appliance are given in Paragraph 3.4 → 9.

Supporting base

Always place the appliance on a levelled flat surface made of fireproof material and able to support the weight of the appliance.

- **Installation at ground level**

If a horizontal base is not available (see also "Supports and levelling"), it is necessary to create a flat level base in concrete at least 100-150 mm larger than the dimensions of the base of the appliance on each side.
For the dimensions refer to the tables in Paragraph 3.4 → 9.

- **Installation on a terrace or roof**

Position the appliance on a levelled flat surface made of fireproof material (see also "Supports and levelling").
The structure of the building must be able to sustain the weight of the appliance added to that of the supporting base.
For the weight refer to the tables in Paragraph 3.4 → 9.
In addition, it is advisable to use flexible connections (anti-vibration joints) between the appliance and the hydraulic and gas supply pipes.

Avoid placing the appliance on the roof directly above locals requiring quietness.

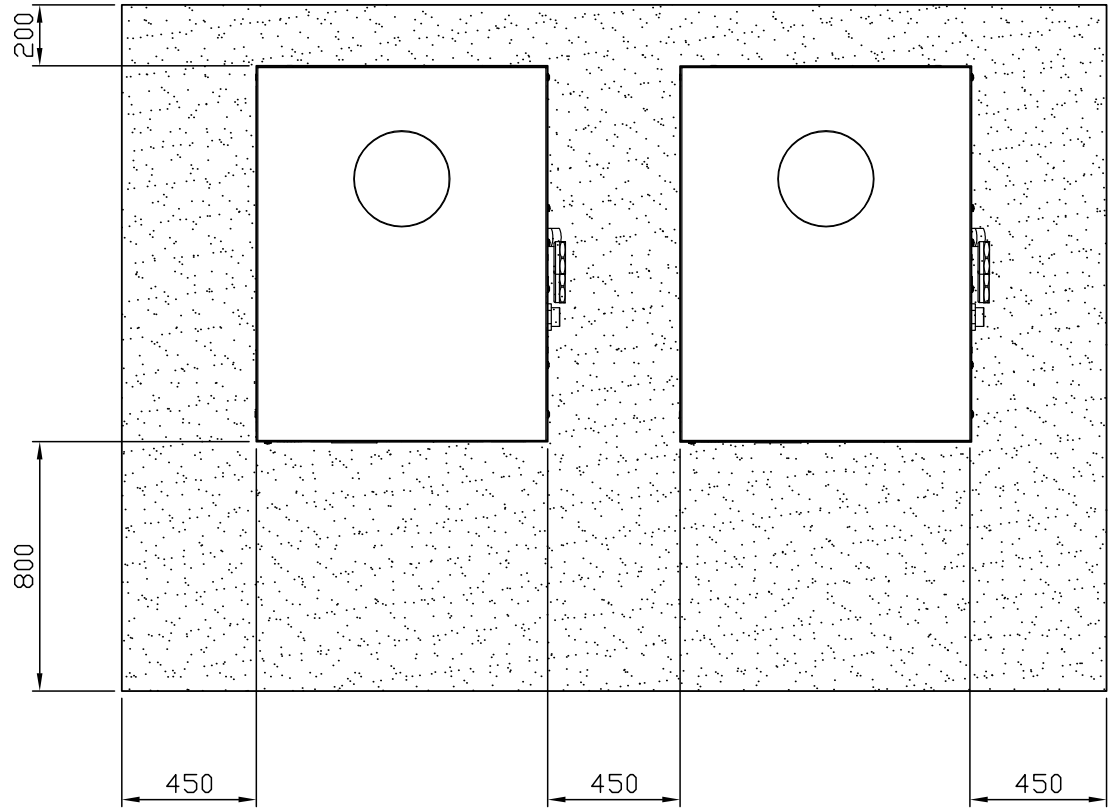
Supports and levelling

The appliance must be correctly levelled by placing a spirit level on the upper part.
If necessary, level the appliance with metal shimming; do not use wooden spacers as these deteriorate quickly.
CLEARANCES AND WARNINGS
Position the appliance so as to maintain **minimum clearances** from combustible surfaces, walls or other appliances, as illustrated in Figure 5.1 → 19.

Minimum clearances are required for maintenance accessibility.

The fumes outlet terminals must be installed in such a way that they do not allow the fumes to collect or return to the circuit in the unit's installation area. The outlet terminal must be constructed in conformity with established regulations.
Position the appliance preferably out of range of rooms and/or environments where strict silence is required, such as bedrooms, meeting rooms, etc.

Figure 5.1 – Clearances



LEGEND
* dimensions in mm.

sample minimum clearances.

5.3 HYDRAULIC CONNECTIONS

General indications

- The hydraulic plant may be created using pipes in stainless steel, black steel, copper or crosslinked polyethylene suitable for heating and cooling plants. All water pipes and connections must be adequately insulated in accordance with current norms, to prevent heat dispersion and the formation of condensate.
- If glycol antifreeze is to be used (see Paragraph 5.6 → 25), DO NOT USE galvanised pipes or pipe fittings as they are subject to potential corrosion phenomena when glycol is present.
- If using rigid pipes, use vibration damping couplings at the water and gas connections on the appliance's service plate to prevent vibration.

As other hydronic appliances, Robur heating and cooling systems operate with grid-water of good quality. In order to prevent any possible problem of operation or reliability caused by filling or top-up water, please refer to codes and norms about water treatment for thermo-hydraulic installations in civil or industrial applications. Parameters indicated in Table 5.1 → 19 must be complied with.

Table 5.1 – Chemical and physical parameters of water

CHEMICAL AND PHYSICAL PARAMETERS OF WATER IN HEATING/COOLING SYSTEMS		
PARAMETER	**UNIT OF MEASUREMENT**	**ALLOWABLE RANGE**
pH	\	>7 (1)
Chlorides	mg/l	< 125 (2)
Total hardness ($CaCO_3$)	°f	< 15
	°d	< 8,4
Iron	mg/kg	< 0,5 (3)
Copper	mg/kg	< 0,1 (3)
Aluminium	mg/l	< 1
Langelier's index	\	0-0,4

CHEMICAL AND PHYSICAL PARAMETERS OF WATER IN HEATING/COOLING SYSTEMS		
PARAMETER	**UNIT OF MEASUREMENT**	**ALLOWABLE RANGE**
HARMFUL SUBSTANCES		
Free chlorine	mg/l	< 0,2 [3]
Fluorides	mg/l	< 1
Sulphides		ABSENT

1 with aluminium or light alloys radiators, pH must also be lower than 8 (in compliance with applicable rules)
2 value referred to the maximum water temperature of 80 °C
3 in compliance with applicable rules

Water quality can be measured through parameters like acidity, hardness, conductivity, chlorides content, chlorine content, iron content and the like.

The presence of free chlorine in the water, in particular, can jeopardize parts of the installation and Robur units. Therefore, please make sure that free chlorine content and total hardness are compliant with the allowable ranges reported in Table 5.1 → 19.

The way the installation is operated can be the cause of possible degradation of water quality.
Moreover, abnormally massive water top-up or reintegration can cause a drift of chemical or physical above-mentioned parameters. Reintegration should not exceed 5% per year of the total amount of water. It is advised to check regularly the water quality, especially in case of automatic or periodic top-up.
In case water treatment is needed, this operation should be carried out by a professional or competent person, following strictly the instructions by the manufacturer or supplier of the chemical substances for the treatment, since dangers could arise for health, for the environment and for Robur appliances.
Several products for water treatment are available on the market.
Robur does not perform detailed market surveys. Therefore Robur suggests to contact Companies which are specialized in water treatments. They will be able to suggest the best way how to proceed according to the type of installation.
In case washing of the pipes is needed, this operation should be carried out by a professional or competent person, following strictly the instructions by the manufacturer or supplier of the chemical substances for the washing, avoiding the use of substances aggressive for stainless steel or containing/releasing free chlorine.
Please make sure the pipes are properly rinsed in order to remove any residue of chemical substances from the pipes.
Robur is not liable for ensuring that water quality is always compliant with what reported in Table 5.1 → 19. Non-compliance with indications above may jeopardize the proper operation, integrity and reliability of Robur appliances, invalidating the warranty.
For any further detail, please contact directly Robur S.p.A. (tel.+39 035.888.111).
The components described below, to be fitted in proximity to the appliance, are illustrated in the typical hydraulic plant schemes in Figures 5.2 → 22 and 5.3 → 23.

- VIBRATION DAMPING COUPLINGS
- PRESSURE GAUGES (range 0-3 bar).
- FLOW REGULATION VALVE (shutter or balancing).
- WATER FILTER with mesh MIN 0.7 mm and MAX 1 mm.
- BALL CHECK VALVE (also to be fitted on the gas supply line).
- EXPANSION TANK on system common circuit or each individual appliance:

the appliance is equipped with its own expansion tank on the machine's internal circuit. the system circuit thus requires a separate expansion tank, sized in relation to the maximum heat range and the maximum operating pressure of the water in the plant (see the figures for reference mentioned above).

- WATER CIRCULATOR on system common circuit or each individual appliance: chosen to meet the system specifications.
- INERTIAL TANK (OPTIONAL) or accumulator tank:

By the nature of its operating characteristics, the appliance does not strictly require the installation of an inertial tank on the hydraulic plant. The use of an inertial tank is, however, recommended in order to compensate for sudden variations in load, in particular when the plant has a water content of less than 70 litres per appliance.

- ACCCUMULATOR BOILER (OPTIONAL) for hot sanitary water (ACS):

The appliance does not itself produce hot water for sanitary (domestic) applications). If it is to be used for this purpose, a remote accumulator tank must be provided. In this case, any use of glycol in the heating circuit must be FOODSAFE.

- Systems for BLEEDING AIR from the pipes.
- DRAIN COCK (usually dia. ½") for system water.
- PLANT FILLING SYSTEM:

if *automatici* filling systems are used, it is advisable to carry out a seasonal check of the percentage of monoethylene glycol contained in the plant (if present).

Antifreeze

To prevent the water freezing in the internal and system circuits, the appliance is equipped with an antifreeze function.
There are two antifreeze functions, both of which operate only on active modules.
The hydraulic circuit is protected from icing by an electronical anti-freezing function; it operates by activating the water pump (if directly managed by the unit) ed eventually the burner of the units. The function, already factory activated on every unit, can be deactivated only by adding an adequate amount of anti-freezing glycole in the hydraulic circuit or by emptying the hydraulic circuit at the beginning of the winter season.
The second antifreeze function protects the internal circuit against freezing; it runs the internal circuit water circulator. This function may not be deactivated inasmuch it is also used to protect the machine's electronics during normal operation.

The machine is factory charged to 2 bar with a water/glycol mix which enables the machine to be safely stored down to -30°C.

The antifreeze function, in order to protect the internal circuit, actuates the dedicated water circulator so as to keep the water in the circuit at a temperature of more than -10°C and hence the electrical components at more than -20°C. Make sure that the machine's internal circuit is always charged with an adequate glycol solution.

It is therefore necessary to ensure a continuous supply of electricity and gas to the appliance throughout the whole of the winter period. If it is not possible to ensure a continuous supply of electricity and gas to the appliance, use glycol antifreeze of the inhibited monoethylene type.

Active and passive modules

If the Robur appliances are not controlled by a DDC. In appliances with only hot and only cold modules (e.g.: AY series) or appliances of the 4 pipe type with two distinct cold and hot modules, the module is ALWAYS "active". in 2 pipe type (hot and cold) appliances, the "cctive" module is the one that operated the last shutdown; the other module will be the "passive" module.

If the appliances are controlled by a DDC. If the DDC manages a 2 pipe type plant (only hot, or only cold), or a 4 pipe type plant (hot and cold), the appliance module is ALWAYS "active". If the DDC is controlling a 2 pipe hot/cold system, the active module is the one set as such on the DDC. As an example, if *heating*is set on the DDC, all the hot modules managed by the DDC will be "active"; all the cold modules controlled by the DDC will be "passive".

If glycol antifreeze is to be used in the hydraulic circuit, DO NOT USE galvanised pipes and connections. Consult the notes on "Possible use of glycol antifreeze" contained in Paragraph 5.6 → 25 and in any case the technical specifications of the glycol to be used.
The sizing of the pipes and pump must guarantee correct operation of the appliance (for calculation of pressure drops in the appliance, refer to the technical data, Paragraph 3.4 → 9).

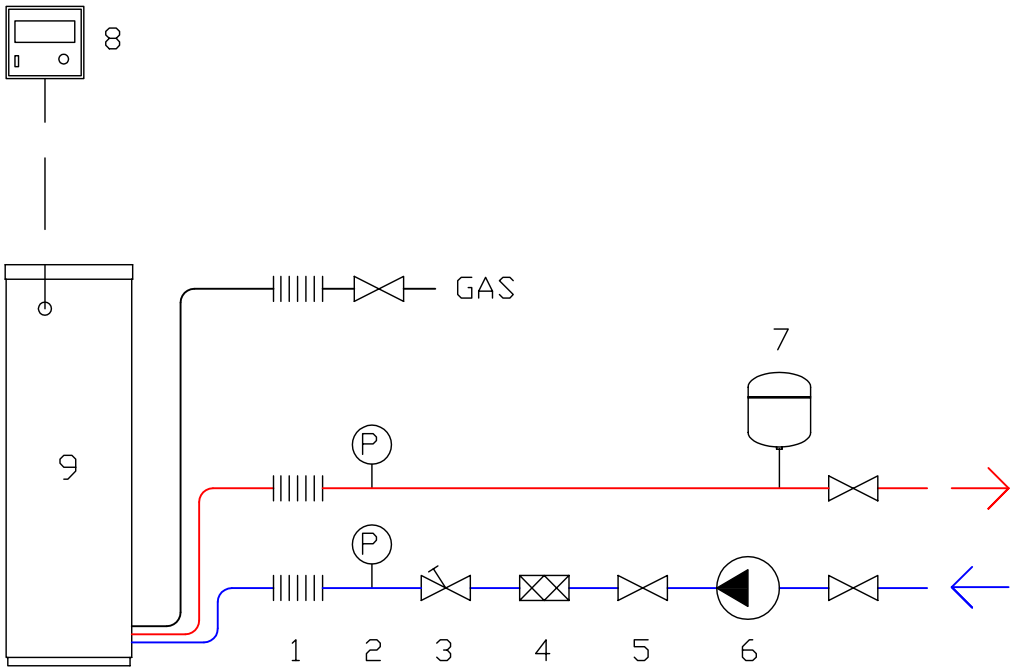
The operations necessary for the first activation or regulation of the appliance and of the Direct Digital Controller must be carried out exclusively by an authorized Robur Technical Assistance Centre (TAC). These operations are described in Section 7 → 50.

The products' guarantee is void if initial activation is not carried out by a Robur TAC.

The following figures show examples of typical hydraulic circuits, composed of a single or multiple appliances.

For further information and technical support regarding other configurations, contact Robur S.p.A. Presales. (tel. 035 888.111).

Figure 5.2 – Diagram of hydraulic system (type with single appliance)

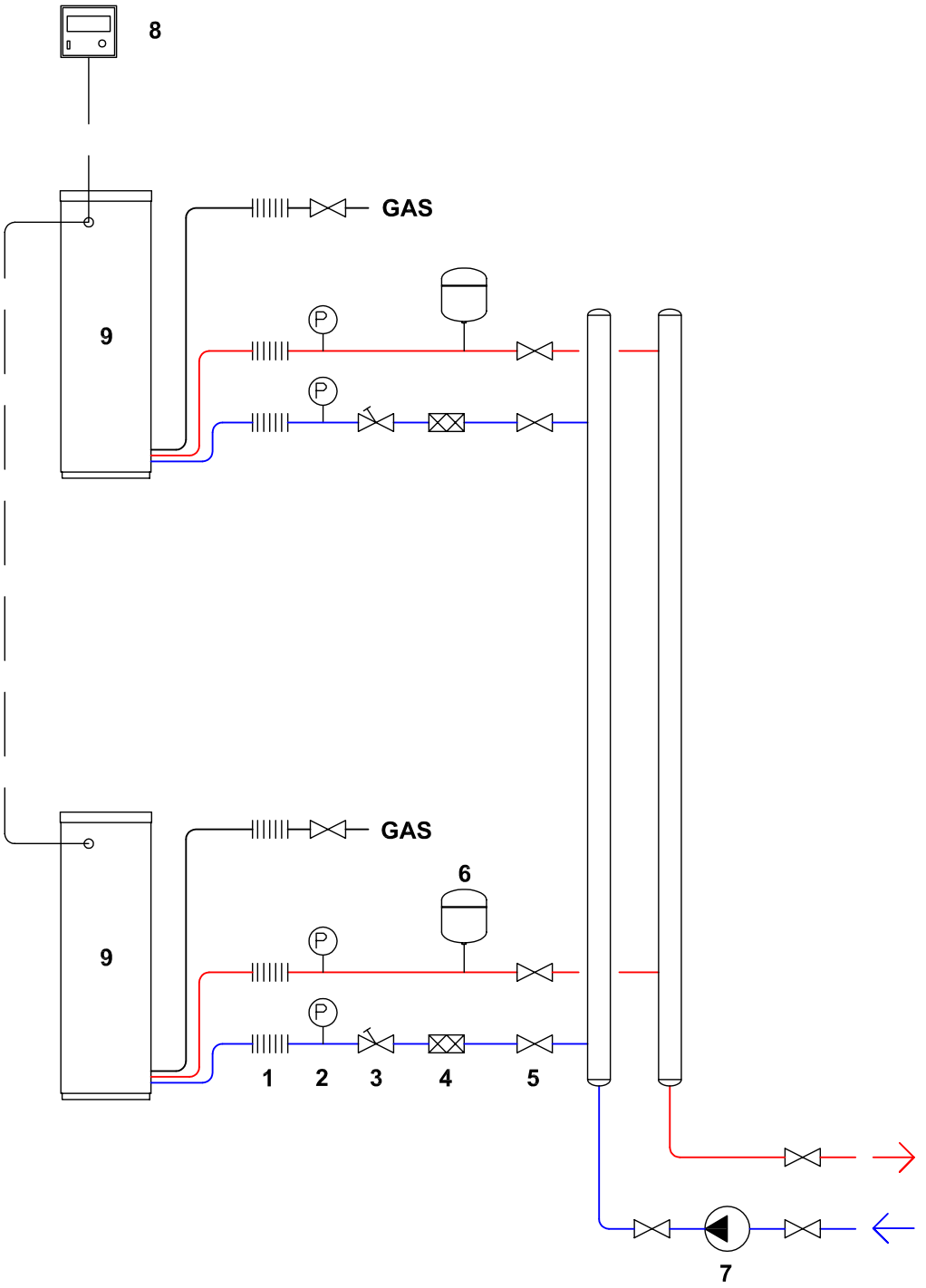


LEGEND

1	anti-vibration coupling
2	pressure gauge
3	flow regulator valve
4	water filter
5	check valve
6	system water circulator
7	system expansion tank
8	DDC
9	AY00-120 stand-alone

Example of hydraulic plant diagram for connection of no. 1 AY00-120 unit.

Figure 5.3 – Diagram of hydraulic system (type with several appliances)



LEGEND

1	anti-vibration coupling
2	pressure gauge
3	flow regulator valve
4	water filter
5	check valve
6	system expansion tank
7	system water circulator
8	DDC
9	AY00-120 stand-alone

Example of hydraulic plant diagram for connection of no. 2 AY00-120 units.

5.4 GAS SUPPLY

The installation of gas supply pipes must be compliant with current regulations and norms.
For the pressure of the gas supplied by the mains see Table 5.2 → 24.

Supplying gas to the appliance at pressures higher than those indicated above can damage the gas valve, resulting in dangerous situations.

LPG systems must be equipped with a first stage pressure reducer close to the LPG storage tank, in order to reduce the gas pressure to 1,5 bar, and a second stage pressure reducer, close to the unit, in order to reduce pression from 1,5 bar to the value in agreement with the gas network pressure of the country of installation (see Table 5.2 → 24).

Exemple for the Italian market: for the G30 gas, from 1,5 bar to 0,030 bar (30mbar); for the G31 gas, from 1,5 bar to 0,037 bar (37mbar).

LPG may cause corrosion; piping and fitting materials must be resistant to this corrosion.

Vertical gas pipes must be equipped with a siphon and provided with a drain for the condensate that may form inside the pipe during cold periods. It may also be necessary to insulate the gas pipe to prevent the formation of excessive condensate.

In any case, provide an isolation valve (ball valve) on the gas supply line, to isolate the appliance when required.

Table 5.2 – Network gas pressure

AY00-120; E3 AY00-120		Gas supply pressure						
Product categories	**Countries of destination**	**G20 [mbar]**	**G25 [mbar]**	**G30 [mbar]**	**G31 [mbar]**	**G25.1 [mbar]**	**G27 [mbar]**	**G2,350 [mbar]**
$II_{2H3B/P}$	AL, BG, CZ, DK, EE, FI, GR, LT, NO, SE, SI, SK, TR	20		30	30			
	AT, CH	20		50	50			
	HR, MK, RO	25		30	30			
	IT	20		28-30	37			
II_{2H3P}	AL, BG, CZ, ES, GB, IE, LT, PT, SI, SK	20			37			
	HR, MK, RO	25		37	37			
$II_{2HS3B/P}$	HU	25		30	30	25		
II_{2E3P}	LU	20			50			
$II_{2ELL3B/P}$	DE	20	20	50	50			
II_{2Esi3P} *	FR	20	25		37			
$II_{2L3B/P}$	NL		25	50	50			
$II_{2E3B/P}$	PL	20		37	37			
$II_{2ELwLs3B/P}$		20		37	37		20	13
$II_{2ELwLs3P}$		20			37		20	13
$I_{2E(S);I3P}$	BE	20	25		37			
I_{2H}	LV	20						
I_{3B}	MT			30				
$I_{3B/P}$	CY, MT			30	30			
I_{3P}	IS				30			

Note: values reported in table are the nominal one, it is in any case accepted a value within the tollerance range of ±15% (Pmin/Pmax).
For data regarding hourly fuel consumption of the appliance, refer to Table 3.1 → 9.

5.5 CONDENSATE DISCHARGE

The fumes exhaust pipe is located on the right of the appliance on the service plate.
To install/connect the condensate discharge pipe, proceed as follows:
The condensate discharge to the sewer must be:

- made of materials resistant to acidity with pH 3 to 5;
- sized to ensure a slope of 10 mm per metre of length; if this slope cannot be achieved, a condensate pump (available as an accessory) must be installed near to the discharge - see Section 8 → 58);
- realized in such a way as to prevent icing of the condensate;
- mixed, for example, with domestic effluent (washing machine, dishwasher, etc.), usually of base pH, so as to form a buffer solution before discharge into the sewer.

Do not discharge the condensate into the gutter drains, given the risk of icing and degradation of the materials usually used for such drains.

CHARGING THE SIPHON

In case of residential installation, to prevent an initial discharge of combustion products from the condensate drain, charge the siphon itself as follows:

1. remove the appliance's front panel and open the interior panel to access the siphon;
2. if the fumes exhaust equipment has not yet been installed, pour 0.2 litres of water directly into the plastic fumes exhaust pipe accessible from the top panel (see Figure 5.6 → 28 - detail "D") and visually check that the siphon is full, then go to step 5. Otherwise, proceed as follows;
3. remove the clamp, disconnect the plastic siphon pipe and fill it with 0.2 litres of water;
4. reconnect the plastic pipe and secure it with its clamp;
5. restore the appliance.

If the appliance is operated with the siphon empty, there is a risk of leaks of combusted gas.

5.6 FILLING THE SYSTEM CIRCUIT (APPLIANCE)

After having completed all hydraulic, gas and electrical connections, the installer can proceed filling the hydraulic circuit, observing the following steps:

- ► Activate the automatic air vent valves on the system circuit.
- ► Fill the hydraulic circuit, ensuring the minimum water content in the plant, and adding, if necessary, to the plant water (free of impurities) a quantity of monoethylene glycol in proportion with the minimum winter temperature in the installation zone (see table 5.3 → 25).
- ► Bring the plant to the correct pressure, making sure that the pressure of the water in the plant is not less than 1 bar and not over 2 bar.

Possible use of glycol antifreeze

Glycols, normally used to lower the freezing point of water, are substances in an intermediate state of oxidisation which, in the presence of oxidising agents such as oxygen, are transformed into corresponding acids.
This transformation into acids increases the corrosive nature of the fluid contained in the circuit. For this reason, mixtures that are commercially available almost always contain inhibiting substances that are able to control the pH of the solution.
A necessary condition for the oxidisation of the glycol, and therefore its degradation, is the presence of an oxidising agent such as oxygen.
In closed circuits in which no replenishment of water, and therefore of oxygen, occurs over the course of time, once the oxygen initially present has reacted, the degenerative phenomenon of glycol is hugely inhibited.
Most circuits, however, are of the non-sealed type, and therefore receive a more or less continuous supply of oxygen.
Therefore it is essential, whatever type of glycol is in question, to verify that it is adequately inhibited and that the necessary checks are regularly performed during its entire period of use.

Antifreeze liquids for cars, which do not contain inhibiting components, are not recommended for cooling and heating plants. **The manufacturer does not accept any contractual or extra-contractual liability for damage caused by the use or incorrect disposal of glycol antifreeze.**

It is equally important to recall that the use of monoethylene glycol modifies the thermophysical characteristics of the water in the plant, and in particular its density, viscosity and average specific heat. Always check the date of expiry and/or degradation of the product with the supplier.
Table 5.3 → 25gives the approximate freezing temperature of the water and consequent increased drop in pressure of the appliance and of the circuit of the plant, according to the percentage of monoethylene glycol. This table should be borne in mind when sizing the pipes and water circulator: for pressure drop calculations, see the data in paragraph 3.4 → 9).
Nevertheless, it is advisable to consult the technical specifications of the monoethylene glycol used. If automatic loading systems are used, a seasonal check of the quantity of glycol present in the plant is also necessary.

Table 5.3 – Technical data for filling the hydraulic circuit

% of MONOETHYLENE GLYCOL	10	15	20	25	30	35	40
WATER-GLYCOL MIXTURE FREEZING TEMPERATURE	-3°C	-5°C	-8°C	-12°C	-15°C	-20°C	-25°C
PERCENTAGE OF INCREASE IN PRESSURE DROPS	--	6%	8%	10%	12%	14%	16%

5.7 FILLING THE APPLIANCE'S INTERNAL CIRCUIT

The machine is factory charged to 2 bar with a water/glycol mix which enables the machine to be safely stored down to -30°C.

The antifreeze function, in order to protect the internal circuit, actuates the dedicated water circulator so as to keep the water in the circuit at a temperature of more than -10°C and hence the electrical components at more than -20°C. Make sure that the machine's internal circuit is always charged with an adequate glycol solution.

Remove the front panel of the appliance to read the internal circuit charging pressure of the appliance on the external filling pressure gauge (Figure 5.4 → 26, detail B).
The optimal pressure value is in the range 1 and 2 bar. If the internal circuit must be recharged, proceed as follows:

The internal circuit is hermetically sealed. If the circuit is empty (this is a fault), identify the leak and restore the seal (for example, by replacing defective gaskets) before proceeding.

You will need: 50-50 glycol solution; volumetric charging pump capable of pressuring the circuit to 2 bar; hose to connect to the provided D.13 union; provided union.

1. Remove the front panel.
2. Open the internal front panel.
3. Remove the cap closing the filler cap and connect the provided D.13 union (Figure 5.4 → 26, detail D).

4. Connect the volumetric charging pump to the union with a hose.
5. Open the filler cock (Figure 5.4 → 26, detail C), with a flathead screwdriver, and charge the circuit with enough glycol solution to achieve the specified optimal pressure.

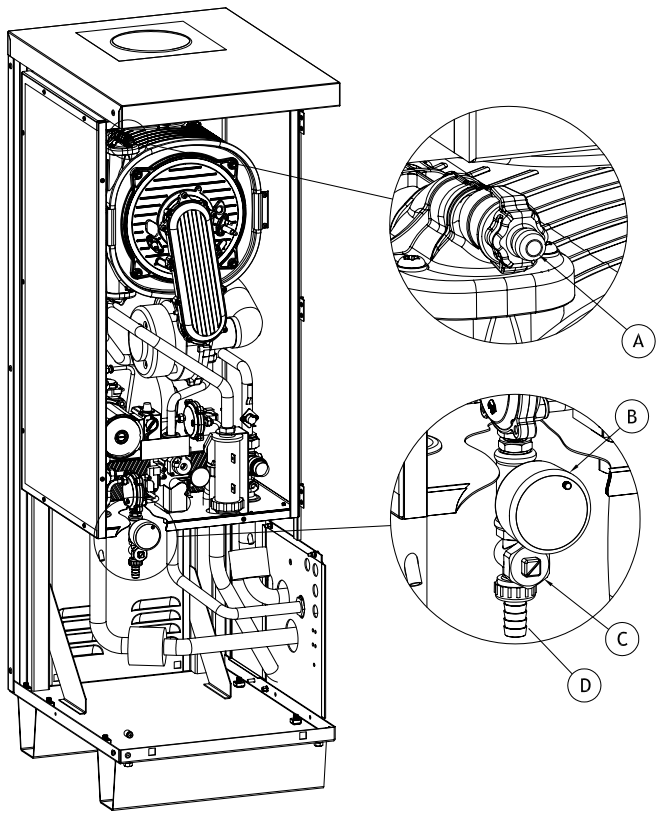
Take care not to allow air to enter the circuit.

1. Open the cap on the automatic bleed valve on the internal circuit and run the machine for 3 minutes to bleed the circuit.
2. If the circuit gurgles during operation, this indicates that air is present in the circuit; connect a hose to the manual bleed cock on the top of the combustion unit (Figure 5.4 → 26, detail A), open the cock by turning it counterclockwise and bleed the circuit. Once the circuit has stopped gurgling, close the cock and remove the hose.

During manual bleeding, any liquid which has been bled out of the circuit must be replaced with the charging pump. Make sure that the circuit pressure is 1-2 bar on completion of the following procedure.

1. Stop the circuit operating, close the charging cock with a flathead screwdriver and close the automatic bleed valve on the circuit.
2. Disconnect the volumetric pump, remove the union and replace the filler cap.
3. Close the front panel with its retainer bolts.
4. Restore the appliance and put away the union.

Figure 5.4 – Filling the machine's internal circuit



LEGEND

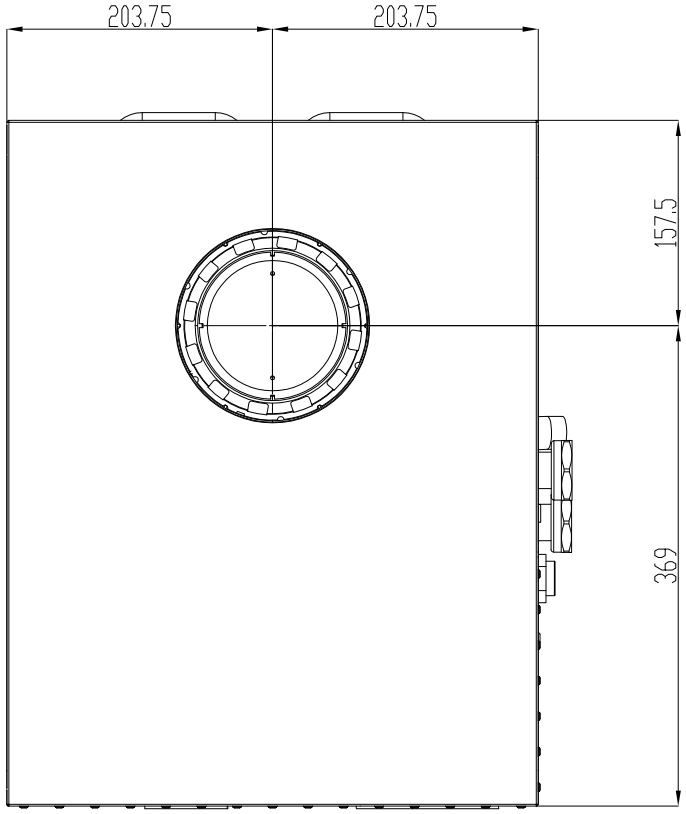
A	manual air vent cock
B	pressure gauge
C	filler cock *
D	hose fitting D.13 standard supply
*	notch in horizontal position: cock closed; notch in vertical position: cock open.

Detailed description of filling procedure.

5.8 EXHAUST FLUE GAS

The appliance, which is supplied in the B53P configuration for installation in the open, is equipped as standard supply with a DN80 fumes kit (nominal diameter 80 mm).
The supplied fumes kit must be installed by the installation technician.
The DN80 union for connecting the fumes kit to the appliance is located at the top of the latter (see Figure 5.5 → 27) with a vertical outlet.

Figure 5.5 – AY Condensing line, AY series



Fumes outlet fitting (dimensions in mm) - seen from above.

FUMES EXHAUST EQUIPMENT FOR EXTERNAL INSTALLATION (installation technician only)

Install the equipment externally as follows (see Figure 5.6 → 28).

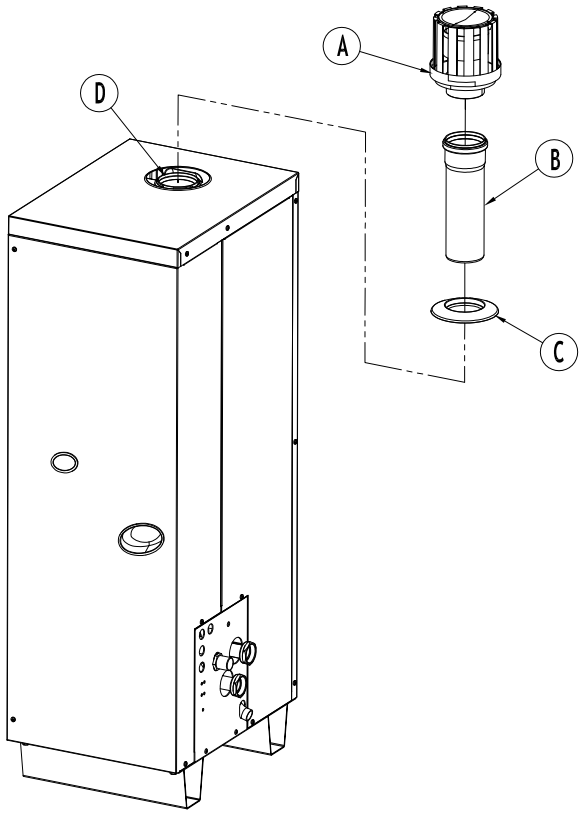
You will need: the appliance in its permanent location. Necessary equipment and materials.

1. Fit the DN80 roof terminal (detail A) inside the cone on the end of the DN80 extension pipe (detail B).
2. Fit the DN80 rain guard (detail C) to the DN80 extension pipe (B), with the rain guard lip turned towards the exterior of the kit (A+B+C).
3. Remove the protective cap on the top panel.

The cap prevents water and foreign bodies entering the appliance before the fumes kit is installed. The cap should thus be removed only when the kit itself has been fully assembled and installed.

4. Fit the DN80 extension pipe (assembly A+B+C) into the cone of the DN80 flanged union which can be accessed via the appliance's top panel (detail D). Take care to position the rain guard properly so that it prevents foreign bodies entering the hole in the top panel.

Figure 5.6 – Fumes evacuation pipe kit



LEGEND

A	roof mounting terminal (DN80)
B	extension tube (DN80)
C	rain cover (DN80)
D	flanged fitting (DN80) on top panel
A+B+C	fumes evacuation pipe kit

fumes kit for exterior configuration (B53P).

SIZING FUMES PIPES FOR TYPE B INSTALLATIONS

If the installation requires the combustion products to be conveyed in a type B configuration, the flue must be sized with reference to the following table.

Table 5.4 – Fumes evacuation pipe ducting (type B)

Useful residual head	100 Pa
Maximum length of straight DN80 pipe sections	31.0 m
Equivalent DN80 curve length at 90°	2.0 m

Data for sizing type B installation flues.
Example: to install a horizontal fumes pipe using n. 1 DN80 90° curve, the maximum extension possible with DN80 straight pipe sections is 29 m.

The following other type B configurations are also possible: B23P and B33 (for specifications, see Table 5.6 → 29).

Exhaust pipes exposed to atmospheric agents must be made of black polypropylene or an equivalent weather resistant material. For sizing, refer to the established regulations and the manufacturer's instructions.

SIZING AIR/FUMES PIPES FOR TYPE C INSTALLATIONS

The appliance is homologated for configuration as a type C installation. The following configurations are permitted: C13, C33, C43, C53, C63 and C83 (for specifications, see Table 5.6 → 29).
To install the appliance in a type C configuration refer to the following technical data table for the sizing of the combustion fumes outlet and combustion air intake pipes.

Table 5.5 – Ducting for fumes evacuation and air intake pipes (type C)

Gas type		G20	G25	G25.1	G27	G2.350	G30	LPG	G31
Useful residual head	Pa	120							
Mass of fumes at nominal thermal capacity	kg/h	55.0	62,0	49.0	55.0	56.0	49.0	49.0	56.0
Mass of fumes at minimal thermal capacity		13.0	15.0	12.0	13.0	13.0	12.0	12.0	13.0
Temperature of fumes at nominal thermal capacity	°C	72.5	72,0	72,0	72,0	72,0	71.5	71.5	72.5
Temperature of fumes at minimal thermal capacity		71.6	72,0	71,0	71.5	72,0	71.5	71.5	71.5
CO_2 content at nominal thermal capacity	%	9.4	9.4	10,7	9,35	9,15	12,4	11.4	10.6
CO_2 content at minimal thermal capacity		8.9	8.9	10.2	8,90	8,80	11,5	10,5	10.2

Data for sizing type C air/fumes installation pipes.

Examples of the two principal type C configurations:

- C13 - using a concentric DN60/100 90°C curve, the maximum permitted extension with concentric DN60/100 straight pipe sections is 5.75 m, while the minimum permitted extensions is 0.75 m.
- C33 - the maximum permitted extension with concentric DN60/100 straight pipe sections is 6.25 m.

Exhaust pipes exposed to atmospheric agents must be made of black polypropylene or an equivalent weather resistant material. For sizing, refer to the established regulations and the manufacturer's instructions.

The following table gives a brief description of the possible installation configurations.

Table 5.6 – Installation configuration (types B and C)

TYPE	CONFIGURATION
B23P	The combustion products are exhausted outside, from the wall or roof, while the combustion air is drawn directly from the room in which the appliance is installed. This configuration can ONLY be installed in open areas or areas sufficiently well ventilated and free of combustible powders.
B33	Evacuation of combusted gas into the flue, combustion air drawn directly from the room in which the appliance is installed. This configuration can ONLY be installed in open areas or areas sufficiently well ventilated and free of combustible powders.
B53P	Boiler designed for connection, via its own pipe, to a dedicated combustion product evacuation terminal. The air is drawn from the installation room and the combustion products are evacuated outside the room. This configuration can ONLY be installed in open areas or areas sufficiently well ventilated and free of combustible powders.
C13	Type C boiler connected, via its own pipes, to a terminal installed horizontally on the wall or roof. The outlets of the pipes are concentric or sufficiently close to each other to be exposed to analogous wind conditions.
C33	Type C boiler connected, with its pipes, to a vertical terminal. The outlets of the pipes are concentric or sufficiently close to each other to be exposed to analogous wind conditions.
C43	Type C boiler connected, via its pipes and optionally with a fitting, to a collective piping system composed of a pipe for combustion air supply and a pipe for combustion product evacuation. The outlets of the system of collective pipes are concentric or sufficiently close to each other to be exposed to analogous wind conditions.
C53	Type C boiler connected, via its separate pipes, to two terminals which can be installed in zones at different pressures.
C63	Type C boiler designed for connection to a system for combustion air supply and combustion product evacuation which is approved and sold separately.
C83	Type C boiler connected, via its pipes, and optionally via a fitting, to an air supply terminal and connected to a dedicated or collective flue.

Description of possible appliance installation configurations.

5.9 PROGRAMMING OF HYDRAULIC PARAMETERS

The hydraulic parameters can be set according to the procedure described in this paragraph only when the appliance is not connected to a DDC.

If the appliance is connected to a DDC, follow the instructions given in the DDC manuals exclusively.

To configure the hydraulic parameters, access menu 3 of the controller.

For the use of the controller, refer to procedure "HOW TO ACCESS THE MENUS" in Paragraph 4.2 → 14.

Table 5.7 → 29 gives the three parameters used for hydraulic configuration.

Table 5.7 – Menu 3 parameters

HYDRAULIC PARAMETER	THE DISPLAY SHOWS
Hot water thermostat control selection	3.160
Hot water setpoint	3.161
Hot water temperature differential	3.162
(EXIT MENU)	3. E

Description of parameters

- *Hot water* thermostat control: parameter "160". This parameter takes two values: "0" and "1". Value "0" indicates that the appliance's "activation/deactivation" temperature is to be read by the water probe at the appliance's INTAKE. Value "1" indicates that the appliance's "activation/deactivation" temperature is to be read by the water probe at the appliance's OUTLET.

- *Hot water* setpoint: parameter "161". this parameter sets the water temperature that, when reached, causes the appliance to be deactivated.
- *Hot water* differential: parameter "162". This parameter represents an interval in degrees that, when added to the set-point, defines the temperature at which the appliance is reactivated.

Heating mode:
The appliance heats the water until it reaches the *setpoint* temperature. The appliance then switches off. This means that the water temperature slowly drops to the *setpoint* + *differential* temperature. At this point, the appliance turns back on.
For example, if we set the following values:
- *Thermostat control*: "0" (= read INTAKE water temperature).
- *Setpoint*: +40.0 °C.
- *Differential*: -2.0 °C.

The appliance will behave as follows:
1. the water temperature rises (heating);
2. the intake water temperature reaches +40 °C (= setpoint);
3. The appliance switches off;
4. the system water temperature slowly drops (loses heat to the environment);
5. the intake water temperature reaches +38 °C (= setpoint + differential);
6. the appliance turns back on: heating starts again. The cycle is repeated.

The following instructions give a detailed description of how to configure the hydraulic parameters in menu 3 (or menu 4) on the machine's controller.

Hydraulic parameter settings

You will need: the controller's display sequentially shows the operating data (temperature, delta T°) regarding the current mode (e.g.: heating). Special key provided with the appliance.

1. See procedure "HOW TO ACCESS THE MENUS" (Paragraph 4.2 → 14) and proceed as described in steps "1" to "5".
2. The display will now flash "0.". Turn the knob until menu 3 displays (the display shows "3.") or menu 4 (the displays shows "4.").

- For example: to set the parameters of menu 3:

1. The display shows "3.". Press the knob to access the menu. the display shows the first of the menu parameters: "3.73" or "3.160" (= menu 3, parameter "73" or "160").
2. The display shows "3.73" or "3.160". To access a parameter, press the knob: the displays shows the preset value (e.g. "1"), flashing, to indicate that it can be modified.
3. Press again to confirm "1" (= outlet water thermostat control); to modify the value, turn the knob until "0" displays: press to confirm "0" (= intake water thermostat control).
4. The display now shows the current parameter "3.73" or "3.160" again: the parameter has been set to its new value.
5. Turn the knob to display the next parameter. The display shows: "3.75" or "3.161". To access a parameter, press the knob: the displays shows the preset value (e.g. "60"), flashing, to indicate that it can be modified.
6. Press again to confirm "60" (= water temperature setpoint); to modify the value, turn the knob until the desired value displays (e.g. "40"): press again to confirm "40" (= water temperature setpoint);
7. The display now shows the current parameter "3.75" or "3.161" again: the parameter has been set to its new value.
8. Turn the knob to display the next parameter. The display shows: "3.76" or "3.162". To access a parameter, press the knob: the displays shows the preset value (e.g. "-10"), flashing, to indicate that it can be modified.
9. Press again to confirm "-10" (= water temperature differential); to modify the value, turn the knob until the desired value displays (e.g. "-2"): Press again to confirm "-2" (= water temperature differential).
10. The display now shows the current parameter "3.76" or "3.162" again: the parameter has been set to its new value.
11. To quit menu 3, turn the knob clockwise until the quit screen displays: "E". The display shows "3.". E": press the knob. The display will now show the current menu "3.". To exit the menu selection screen, turn the knob clockwise until "E" displays: press to confirm.

The controller's display now sequentially shows, as at the beginning, the operating data (temperature, delta T) regarding the current mode (e.g.: heating).

To modify a parameter in menu 4, to access the menu (installation technician only) you are first prompted for a password. For the password, contact the Robur TAC or *Technical Service Department* of Robur S.p.A. (Tel. +39.035.888111).

The special key allows the knob of the electronic board to be operated without opening the cover of the electrical panel, so that operators are protected from live components. When the necessary settings have been completed, put away the special key, replace the cap on the aperture of the electrical panel and refit the front panel of the appliance.

SPECIAL PARAMETER SETTINGS

The appliance is a Range Rated boiler: the power delivery of the appliance can be adapted to the real system requirements by regulating the nominal gas flow (nominal thermal input).
The thermal input can be regulated with parameter "180" in menus 4 and 5. The parameter has a range from maximum (34.9 kW) to minimum (8.0 kW) thermal capacity (see also Table 3.1 → 9).

If multiple appliances are connected to the system, the value of parameter "180" must be the same for all appliances.

To prevent errors in setting the hydraulic parameters available to the user in menu 3, we recommend setting the maximum water temperature setpoint, both at the outlet (parameter "156") and the intake (parameter "157"), accessible in menu 5 (and hence for the Robur TAC only). For example, if the appliance is used on a system for underfloor heating, parameters "156" and "157" must be set to limit the user's options in setting temperature setpoint parameter "161" (also available in menu 3) and thus prevent operational settings outside the installation design limits.
The appliance's internal circuit is factory charged, ad hoc, with a monoethylene glycol solution sufficient to enable storage down to -30°C. Any topping up of the initial charge must restore the optimal water/glycol mix (50/50).
However, parameter "180" allows the appliance to be configured for operation with pure water or a non-optimal glycol solution (value "0": no glycol in the machine's internal circuit); in this case the antifreeze function will activate the internal water circulator to keep the water temperature above +4°C. Within the limits of the design minimum ambient temperature it may be necessary, in such cases, to ensure continuous electrical power to the appliance even during periods of disuse.

Parameter "156" is to be used ONLY by the Robur TAC; parameters "180" and "182" are also available to the installation technician. These special parameters may be configured, when so required, only by the Robur TAC or the installation technician, when authorised to do so.

6 ELECTRICAL INSTALLATION

In this section you will find all the instructions necessary to connect electrically the appliance.
The procedures to follow in order to complete the entire process of electrical installation of the appliance are the following:

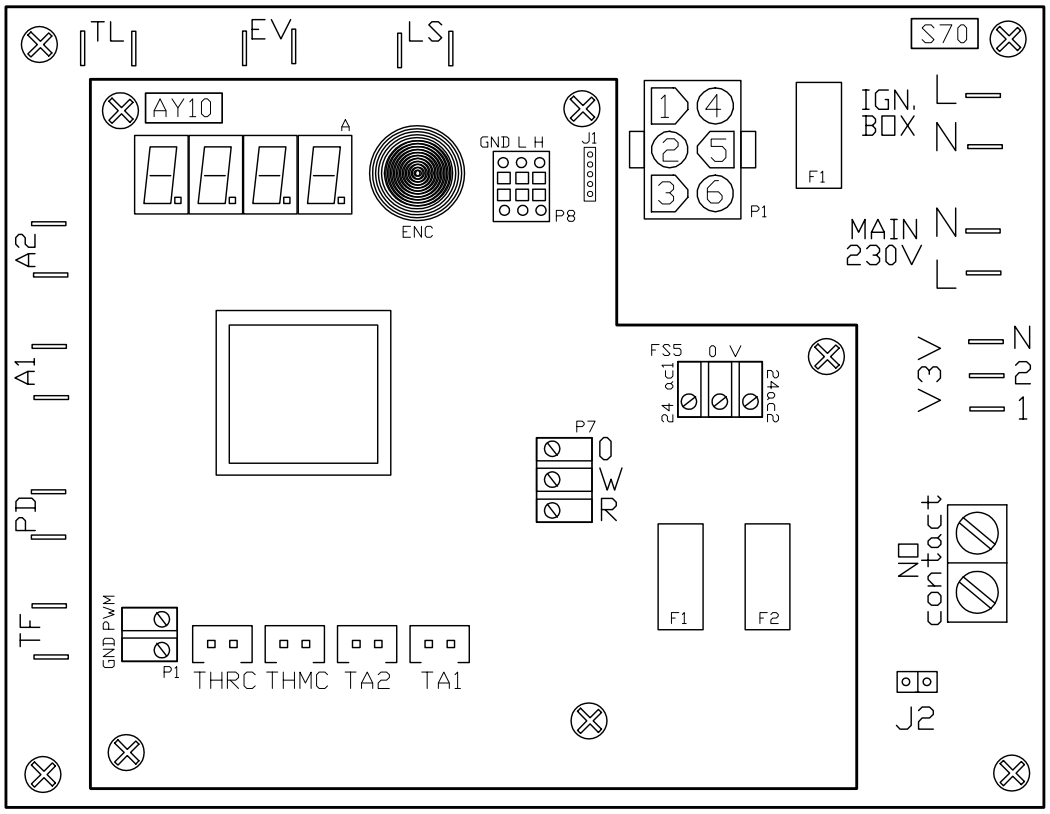
1. CONNECTING THE APPLIANCE TO THE MAINS.
2. ELECTRICAL CONNECTIONS FOR THE SYSTEM CIRCULATOR.
3. CONNECTIONS FOR CONSENT SWITCH OPERATION.

Before proceeding with operations to create the electrical plant of the appliance, the professionally qualified personnel concerned are advised to read Paragraph 3.1 → 7: it provides important information regarding installation safety and references to current regulations.

Before making the electrical connections or any checks, make sure that work is not carried out on live elements.

Figure 6.1 → 32 illustrates, in their main parts, the on-board electronics: controller *AY10* overlaying the auxiliary controller *S70* (for the legend, see Table 6.1 → 32).
Figure 6.2 → 34 detail plant of the appliance.

Figure 6.1 – Series AY - AY10+S70 controllers



LEGEND
see table below

Main components of the on-board controller.

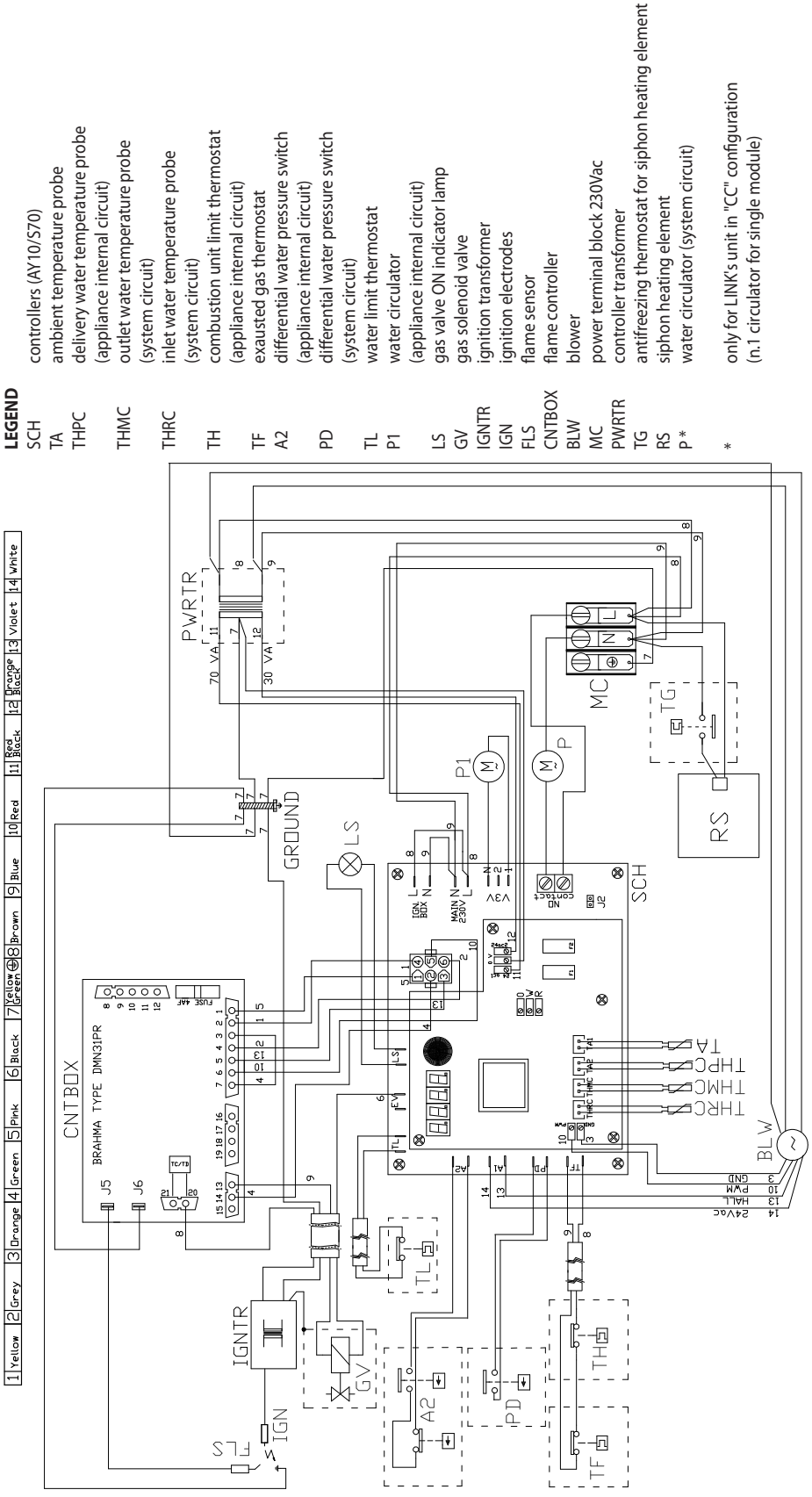
Table 6.1 – AY10 and S70 controller components

CONTROLLER COMPONENT LEGEND	
CODE	**DESCRIPTION**
COMPONENTS OF CONTROLLER **S70**	
TL	limit thermostat connector
EV	gas solenoid valve connector
LS	gas valve ON indicator lamp connector
P1	flame controller connector
TF	fumes thermostat connector
PD	circuit water differential pressure switch connector
A1 - A2	auxiliary connectors
J2	circuit water circulator controller jumper
No Contact	system water circulator controller terminal clamps (max 700W)
V3V (1-2-N)	machine circulator terminal clamps
MAIN 230V (L-N)	power supply connector
IGN. BOX (N-L)	ignition controller connector
COMPONENTS OF CONTROLLER **AY10**	

CONTROLLER COMPONENT LEGEND			
CODE	**DESCRIPTION**		
P1	blower control connector		
	PWM= signal output	GND= ground	
THRC	input hot water temperature probe connector		
THMC	output hot water temperature probe connector		
TA2-TA1	auxiliary temperature probes connector		
J1	CAN BUS jumper		
P8 [GND-L-H]	CAN port / connector		
	H= high data signal	L= low data signal	GND= common data signal
P7 (R-W-0)	operation consent connector		
	R= common terminal	W= HOT consent terminal	0= terminal not used
FS5 [24ac1-0V-24ac2]	controller power connector		
F1 - F2	fuses		

Controller component legend.

Figure 6.2 – Functional diagram



Electric diagram single unit AY00-120.

6.1 CONNECTING THE APPLIANCE TO THE MAINS

The examples of connection of the appliance to the mains in this paragraph refer to:

- ► single appliance plants

► multiple appliance plants

SINGLE APPLIANCE PLANTS

The appliance must be connected to a 230 V 1N ~ 50 Hz power supply, as follows (see example in Figure 6.3 → 35):

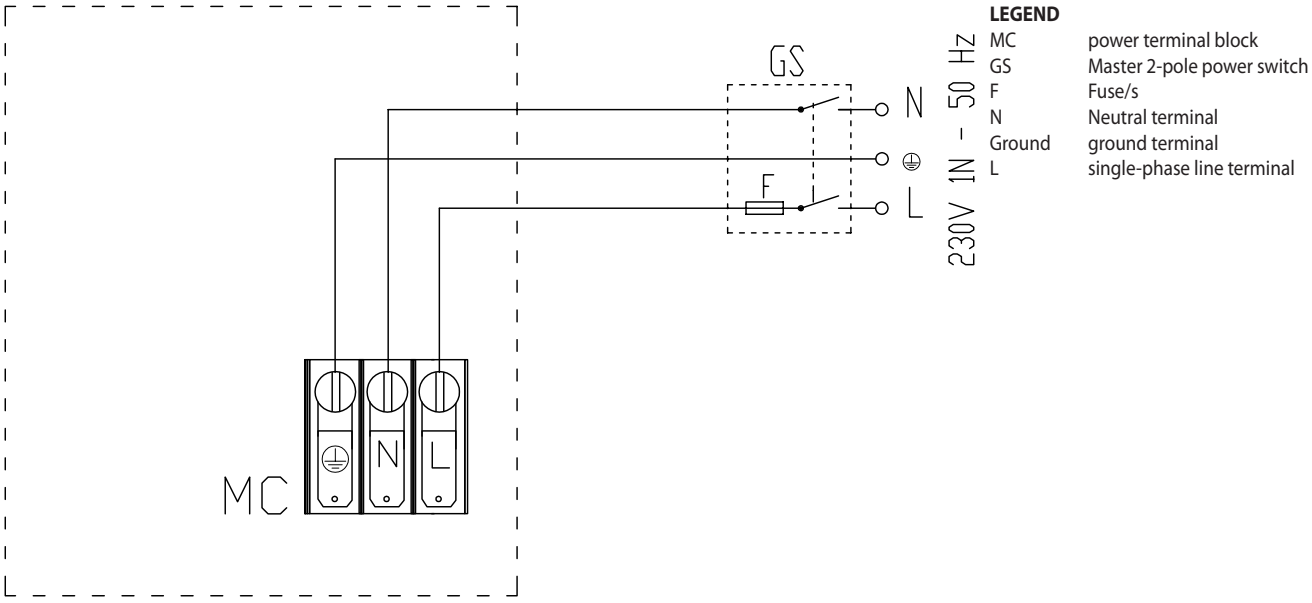
You will need: the appliance connected hydraulically; external electrical panel configured by the installation technician. Necessary equipment and materials.

Make sure that the electrical panel configured by the technician is equipped with a 2 pole circuit breaker with minimum air gap of 3 mm, and a 2A type T fuses.

1. Remove the appliance's front panel and open the electrical panel by removing the bolts securing it.
2. Prepare a cable of the FG7(O)R 3Gx1.5 type for the power supply to the appliance.
3. Locate terminal block "MC" inside the panel and hook up as shown in the figure.
4. On completion, restore the appliance to its fully assembled condition.

The insertion of relays or other electrical components inside the General Electrical Panel of the appliance is not permitted. **Do not activate the appliance if the hydraulic plant has not been filled**.

Figure 6.3 – connection to electrical mains (230 V 1N - 50 Hz)



Example of connection of no. 1 appliance to the mains.

Disconnect the appliance from the electrical power supply via the external disconnecting switch only after having performed the shutdown cycle (via the DDC or consent switch) and having waited for it to terminate (approximately 3 minutes).

Make sure the ground cable is longer than the live cables. In this way it will be the last wire to be pulled away if the mains cable should accidentally be pulled, and will thus guarantee the ground connection. **Do not use gas pipes to ground electrical appliances**.

A wiring error, as well as impeding the correct operation of the appliance, could also damage the electrical apparatus that it contains.

MULTIPLE APPLIANCE PLANTS

The appliance must be connected to a 230 V 1N ~ 50 Hz power supply, as follows (see example in Figure 6.4 → 36):

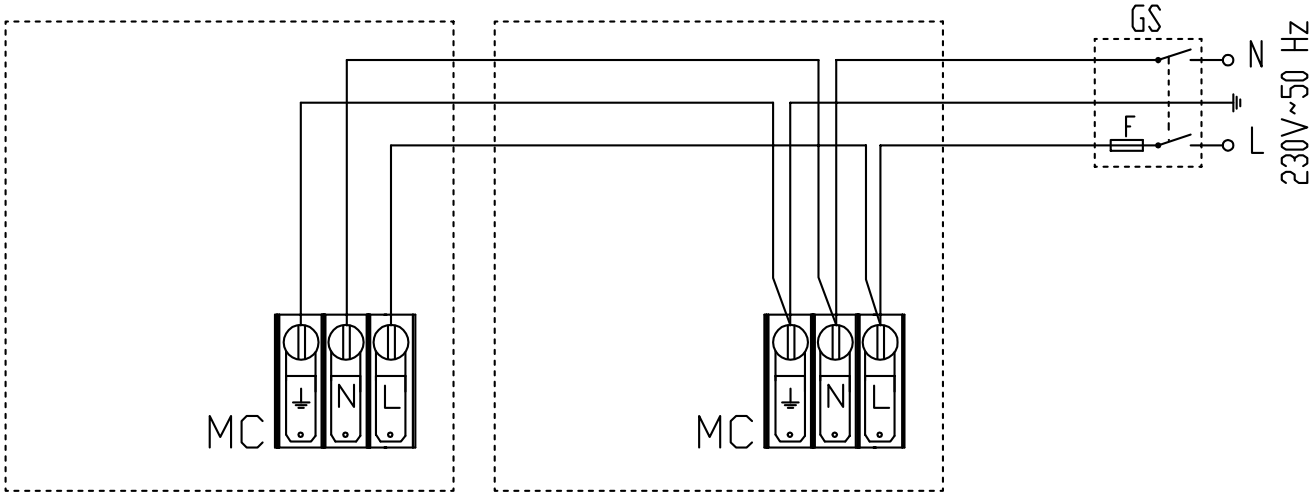
You will need: the appliances hydraulically connected; the external electrical panel configured by the installation technician. Necessary equipment and materials.

Make sure that the electrical panel configured by the technician is equipped with a 2 pole circuit breaker with minimum air gap of 3 mm, and two type T fuses of suitable rating.

1. On each appliance, remove the front panel and open the electrical panel by removing the bolts securing it.
2. For each appliance, provide a FG7(O)R 3Gx1.5 type cable.
3. Locate terminal block "MC" inside the panel of each appliance and hook up as shown in the figure.
4. On completion, restore the appliances to their fully assembled condition.

The insertion of relays or other electrical components inside the General Electrical Panel of the appliance is not permitted. **Do not activate the appliance if the hydraulic plant has not been filled**.

Figure 6.4 – connection to electrical mains (230 V 1N - 50 Hz)



LEGEND

MC	power terminal block
GS	Master 2-pole power switch
F	Fuse/s
N	Neutral terminal
Ground	ground terminal
L	single-phase line terminal

Example of connection of more than one appliance to the mains.

Disconnect the appliance from the electrical power supply via the external disconnecting switch only after having performed the shutdown cycle (via the DDC or consent switch) and having waited for it to terminate (approximately 3 minutes).

Make sure the ground cable is longer than the live cables. In this way it will be the last wire to be pulled away if the mains cable should accidentally be pulled, and will thus guarantee the ground connection. **Do not use gas pipes to ground electrical appliances**.

A wiring error, as well as impeding the correct operation of the appliance, could also damage the electrical apparatus that it contains.

6.2 ELECTRICAL CONNECTIONS FOR THE SYSTEM CIRCULATOR

The primary circulation pump/s must be controlled by the S70 board, or directly (via "N.O. contact" contacts) or indirectly ("OR" use of said contacts by BMS type external systems). Otherwise, the primary circulation pump/s must be running permanently.

CONNECTION FOR CONTROLLING INDEPENDENT CIRCULATORS

This connection applies to hydraulic circuits which have a primary circuit circulator for each appliance (independent circulators) installed on the plant. For example: 1 circulator/1 appliance; 5 circulators/5 appliances.
In such cases, for each appliance it may be sufficient to install a single-phase water circulator (230 V AC), with power absorption less than 700 W.
To make the circulator-appliance connections, proceed as follows (references to Figure 6.5 → 37):

You will need: the appliance connected hydraulically; single-phase water circulator (230 V AC), with power absorption less than 700 W. Necessary equipment and materials.

In this case, the circulator's 230 V AC power can be taken directly off the appliance's internal terminal block (on the electrical panel).

1. Remove the appliance's front panel and open the electrical panel by removing the bolts securing it.
2. Prepare a suitable cable for the connection.
3. Locate terminal block MC and the "NO Contact" terminals on controller S70 (SCH) inside the electrical panel, and hook up as shown in the example.

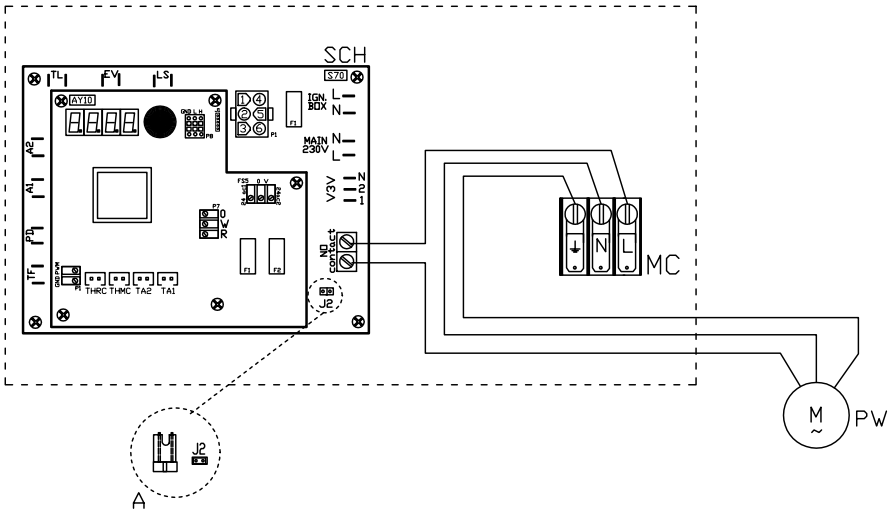
Make sure the ground cable is longer than the live cables. In this way it will be the last wire to be pulled away if the mains cable should accidentally be pulled, and will thus guarantee the ground connection. **Do not use gas pipes to ground electrical appliances**.

A wiring error, as well as impeding the correct operation of the appliance, could also damage the electrical apparatus that it contains.

The "NO Contact" terminals are no voltage contacts with maximum power capacity of 700 W. These contacts control the circulator shutdown delay (2 minutes after appliance shutdown). Check the position of jumper "J2", as follows:

4. Locate, on the appliance's controller (SCH), jumper "J2" on the S70 (bottom right, below the "NO Contact" contacts) and make sure that it is set as shown in detail "A" (jumper closed) of the figure.
5. On completion, restore the appliance to its fully assembled condition.

Figure 6.5 – Direct control of independent circulator



LEGEND

SCH	controller (AY10+S70)
NO contact	system water circulator control terminals (voltage free NO contact, maximum power absorption 700 W)
J2	system water circulator control jumper
A	detail of "closed" jumper
MC	230 V AC power terminal block
PW	system water circulator (230 V AC; <700 W)

Example of "circulator-appliance" electrical connection with single-phase circulator (230 V AC), power less than 700 W.

If the circulator's power is equal to or greater than 700 W, the installation technician must make the following modifications (see figure):

► (point 3) <<... make the connections as shown in the example, but installing a relay for the control of the pump, managed via NO-contact>>. Then:

► (point 4) <<Locate and open jumper "J2" as shown in detail "A" (jumper open) in the next figure 6.6 → 39>>.

Fit the relay inside the external electrical panel provided by the installation technician.

The insertion of relays or other electrical components inside the General Electrical Panel of the appliance is not permitted. **Do not activate the appliance if the hydraulic plant has not been filled**.

CONNECTIONS FOR CONTROLLING A SHARED CIRCULATOR

This connection applies to hydraulic circuits which have a single primary circuit circulator for multiple appliance (shared circulator) installed on the plant. For example: 1 circulator/3 appliances.
In such cases, a three-phase water circulator (400 V AC) may be required.

The choice of water circulator depends on the number of appliances being served as the specifications of the system (water flow rate, head, etc.) which are determined during the design process. Always follow the specifications of the system design documentation.

The following procedure refers to Figure 6.6 → 39, which gives an example of a three-phase circulator (400 V AC) connection.

To make the circulator-appliance connection, proceed as follows (references to Figure 6.6 → 39):

You will need: the appliances hydraulically connected; water circulator in line with the system specifications (e.g.: three-phase/400 V AC); external electrical panel configured by the installation technician. Necessary equipment and materials.

Make sure that the external electrical panel is equipped with a power switch (4-pole) with suitable motor thermal switch, a secondary SELV safety transformer and control relay.

1. On each appliance, remove the front panel and open the electrical panel by removing the bolts securing it.
2. Prepare a suitable cable for the connection.
3. Locate the "NO Contact" terminals on the S70 controller of each appliance and hook up as shown in the Figure.

Make sure the ground cable is longer than the live cables. In this way it will be the last wire to be pulled away if the mains cable should accidentally be pulled, and will thus guarantee the ground connection. **Do not use gas pipes to ground electrical appliances**.

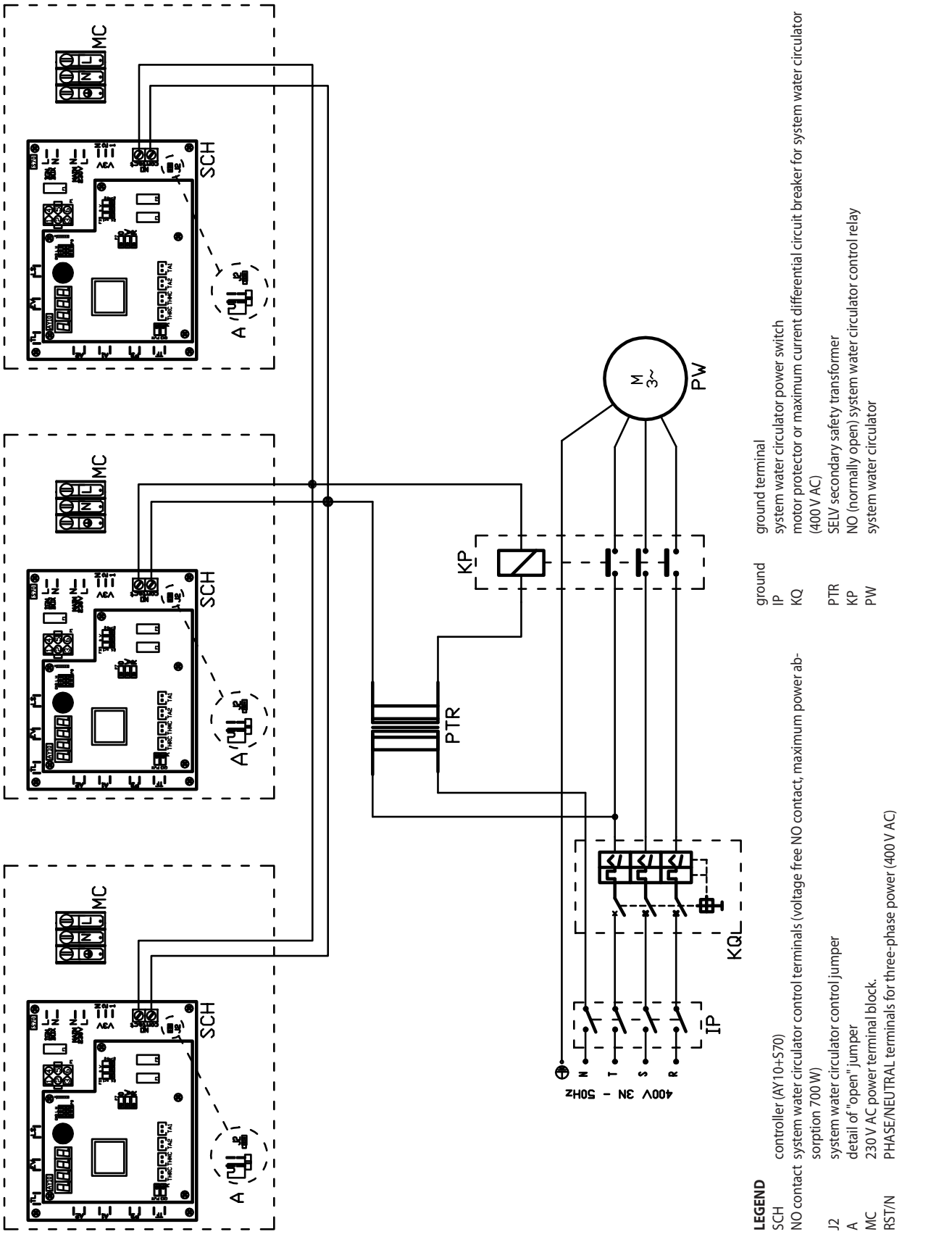
A wiring error, as well as impeding the correct operation of the appliance, could also damage the electrical apparatus that it contains.

The "NO Contact" terminals are no voltage contacts with maximum power capacity of 700 W. These contacts control the circulator shutdown delay (2 minutes after appliance shutdown). Check the position of jumper "J2", as follows:

1. Locate, on each appliance's controller (SCH), jumper "J2" on the S70 (bottom right, below the "NO Contact" contacts) and make sure that it is set as shown in detail "A" (jumper open) of the figure.
2. On completion, restore the appliances to their fully assembled condition.

The insertion of relays or other electrical components inside the General Electrical Panel of the appliance is not permitted. **Do not activate the appliance if the hydraulic plant has not been filled**.

Figure 6.6 – Direct control of shared circulator



Example of electrical connection of a shared three-phase circulator (400 V AC).

6.3 CONNECTIONS FOR CONSENT SWITCH OPERATION

To operate, the appliance requires:

► consent switch for starting up and shutting down the appliance.

The consent switch (installation technician) can be an on/off switch, ambient thermostat, programmable timer, or other such device.

To make the connection, proceed as follows (references to Figure 6.7 → 40):

You will need: the appliance connected hydraulically; consent switch. Necessary equipment and materials.

1. Remove the appliance's front panel and open the electrical panel by removing the bolts securing it.
2. Prepare a suitable cable for the connection.
3. Locate, on the appliance's electrical panel, the consent terminals "R,W,0" (connector "P7") on the AY10 controller, and make the connections between the consent switch and the R and W terminals as shown in the figure.

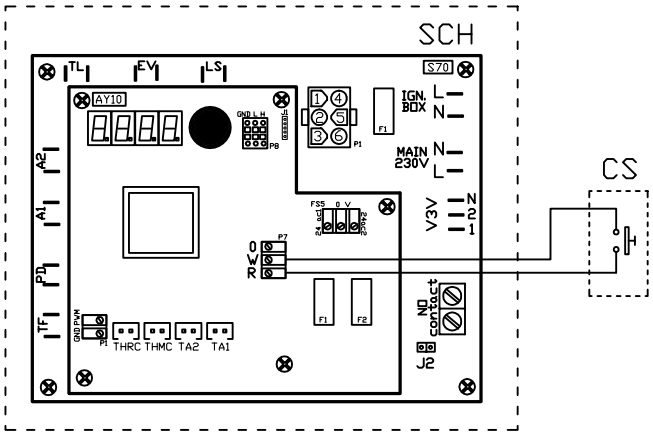
To start up and shut down the appliance in normal operation, always use the consent switch. Do not use the external power switch.

4. On completion, restore the appliance to its fully assembled condition.

The insertion of relays or other electrical components inside the General Electrical Panel of the appliance is not permitted. **Do not activate the appliance if the hydraulic plant has not been filled**.

If you intend to use a DDC, available as an accessory, refer to Paragraph 6.4 → 40.

Figure 6.7 – Series AY - operated by on-off consent switch



LEGEND

SCH	controller (AY10+S70)
W	HOT consent terminal
R	common terminal
CS	consent switch

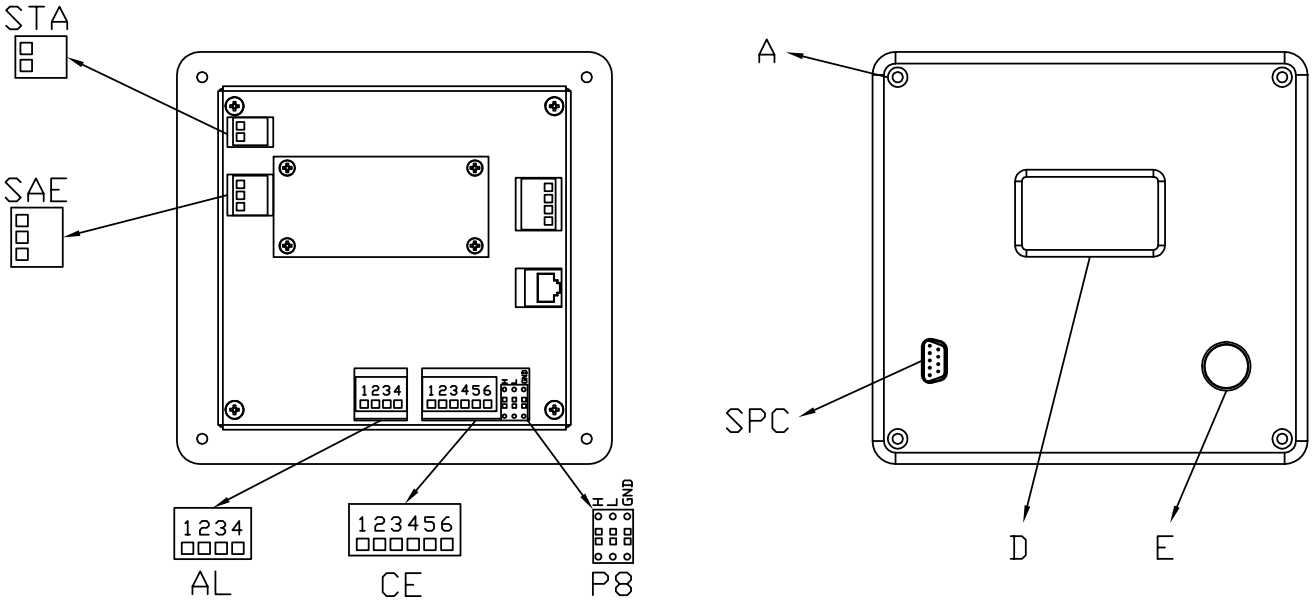
Example of operation consent connection.

6.4 USE OF THE CCI/DDC

This paragraph is dedicated to the installation of the Direct Digital Controller (DDC). It gives full information on the installation and connection of the device to the appliances.
Proceed as follows (qualified installation technician only):
1) How to fit the CCI/DDC.
2) How to supply power to the CCI/DDC.
3) How to connect the CCI/DDC to the appliance.
Figure 6.8 → 41 gives rear and front views of the DDC along with its electrical connections. The following connectors are required:

- 4 pole connector (part reference "AL") for 24 V AC power.
- 6 pole CAN BUS connector (part reference "P8") for connecting the DDC with the appliance.

Figure 6.8 – CCI/DDC



LEGEND			
STA	ambient temperature probe - 2-pole connector	P8	CAN network connector (orange)
SAE	external alarm systems - 3-pole connector	SPC	232 serial connection to PC - 9-pole connector
AL	power supply 24 V AC - 4-pole connector	A	mounting holes CCI/DDC
CE	external consents - 6-pole connector	E	Encoder
		D	Display

Front and rear views with detail of electrical connections.

For instructions regarding other connections (optional: to be done by the electrical installation technician in accordance with the user's requirements) and, in general, for the DDC installation and user instructions, see the two booklets in question.

Before installing the DDC, disconnect the appliance from its power supply with the power switch in its electrical panel.

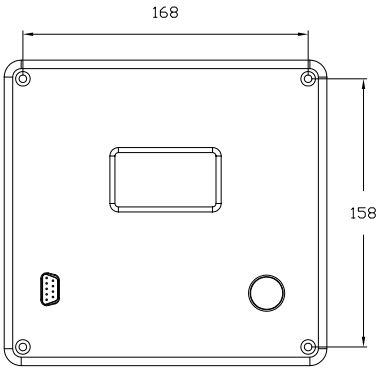
1) How to fit the CCI/DDC

The DDC in indoor installations must be applied to a panel as follows (see Figure 6.9 → 41):

You will need: the appliance and the DDC disconnected from the electricity supply. Necessary equipment and materials.

1. Make a rectangular opening 155 mm wide and 151 mm high;
2. Locate the DDC on this hole and mark the 4 points where the holes are to be made to fix it. See the figure.
3. Drill no. 4 holes of dia. 4 mm.
4. Proceed with the operation of making fast the DDC on the opening of the panel using the screws and nuts supplied.

Figure 6.9



LEGEND
Holes for mounting CCI/DDC's to panel

horizontal: 168 mm
vertical: 158 mm

Centre distances of mounting holes for CCI/DDC.

The DDC's operating temperature range is 0 - 50 °C. If the temperature of the room where the DDC is installed falls below zero, it continues to operate correctly to -10 °C. However, its LCD display may not be able to display data.

2) How to supply power to the CCI/DDC

The DDC requires a low voltage power supply (24 V) with 230/24 V AC, 50/60 Hz safety transformer; the minimum power requirement is 20 VA.

To power the DDC (off a transformer located in an external panel), proceed as follows (see example in Figure 6.10 → 42):

You will need: the appliance disconnected from the electricity supply; the external electrical panel configured by the installation technician. Necessary equipment and materials.

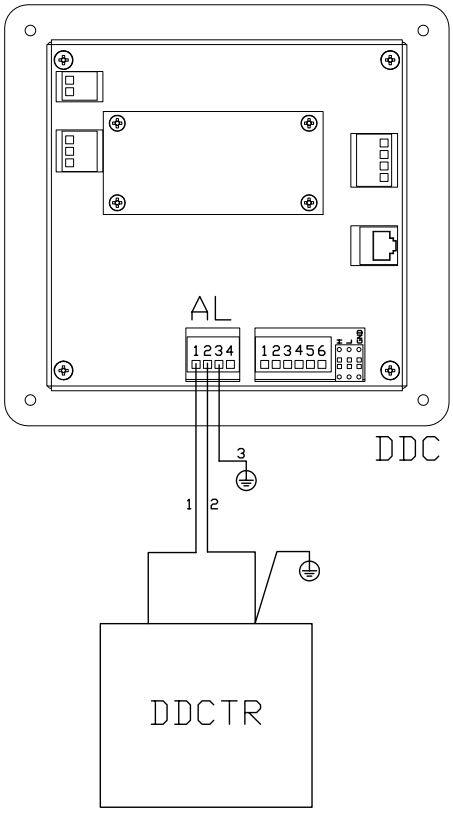
Make sure that the external electrical panel is equipped with a 230/24 V AC - 50/60 Hz safety transformer, of at least 20 VA power.

1. Remove the DDC's back panel by undoing the 4 bolts securing it (detail "A" - Figure 6.8 → 41).
2. Use an electrical power cord (minimum cross section: 2x0.75 mm^2).
3. Pass the power cord (DDC side) through the hole in the DDC's cover and hook up as shown in the example, with the following polarities: *terminal 1* = 24 V; *terminal 2* = 0 V; *terminal 3* = ground.

Terminal *3* of the DDC's 4-pole connector (AL) must be, in any case, connected to a ground plant (r≤0,1Ω). Terminal *2* of the DDC is connected internally to *terminal 3*, and is thus also connected to ground. Make the grounding connection on the transformer terminal connected to terminal *2* of the DDC. if the transformer already has one wire grounded, it must be connected to this terminal.

4. On completion, close the DDC's back panel with the 4 bolts.

Figure 6.10 – CCI/DDC - electric supply



LEGEND

DDC	CCI/DDC
AL	supply 4 poles connector
1	clamp and wire for 24 Vac supply
2	clamp and wire for 0 Vac supply
3	clamp and wire for ground contact (required connection)
DDCTR	safety transformer
- (230/24 Vac	50/60 Hz)

CCI/DDC electric supply from external transformer.

If the CAN BUS cable has already been connected to the DDC (next procedure "3) How to connect the CCI/DDC to the appliance"), take care with the 4 mm CAN BUS cable shielding eyelet (or two eyelets): use the retainer screw next to the CAN BUS socket (bottom right) to secure the eyelet (or both eyelets) as shown in Figure 6.13 → 44.

The DDC is equipped with a backup battery which retains the memory settings in case of power failure. **The battery has a service life of around 7 years**, after which it must be replaced by the Robur TAC.

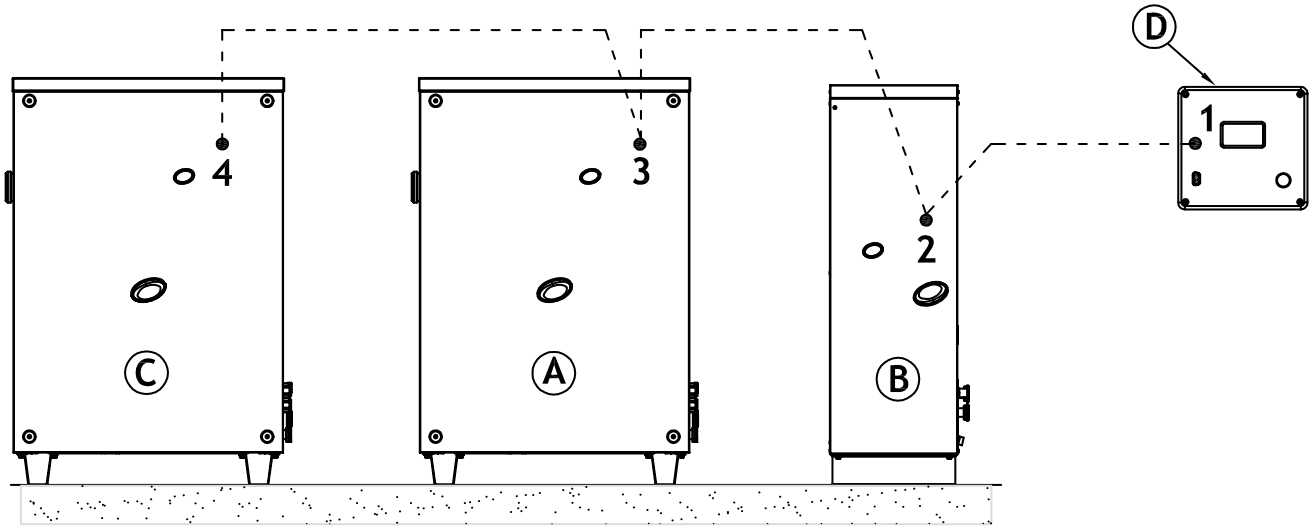
3) How to connect the CCI/DDC to the appliance

The appliance and the DDC communicate with each other via the **CAN network** (*data network*), which is characterised by a number of *nodes*, connected by the *CAN BUS cable*.

By a *node* of the *data network* we mean any device (DDC, appliance or individual module) connected to it. Each network consists of 2 *terminal nodes*and, if required, a certain number of *intermediate nodes*. A device is considered to be a *terminal* node when it is connected to only one other device. A device is considered to be an *intermediate* node when it is connected to two other devices. Appliances, individual modules and DDC's may act equally as terminal or intermediate nodes. See Figure 6.11 → 43.

The CAN network can link together a maximum of: 3 DDC's, each of which is in turn connected to 16 *hot only* modules + 16 *cold only* modules or 16 *hot/cold* modules.

Figure 6.11 – CAN network



LEGEND			
A	appliance (GA/GAHP)	1	CAN-BUS network terminal node
B	appliance (AY)	2	CAN-BUS network intermediate node
C	appliance (GA/GAHP)	3	CAN-BUS network intermediate node
D	DDC	4	CAN-BUS network terminal node

Example of network with 4 nodes (1 DDC + 3 appliances).

> CHARACTERISTICS OF THE CAN BUS CABLE

The cable to be used must be suitable for CAN BUS applications.

The following table gives details of some types of CAN bus cable, grouped according to the maximum distance covered by each single type.

Table 6.2 – CAN BUS cables type

CABLE NAME	SIGNAL / COLOR			MAX LENGTH	Note
Robur					Ordering Code O-CVO008
ROBUR NETBUS	H= BLACK	L= WHITE	GND= BROWN	450 m	
Honeywell SDS 1620					In all cases the fourth conductor should not be used
BELDEN 3086A	H= BLACK	L= WHITE	GND= BROWN	450 m	
TURCK type 530					
DeviceNet Mid Cable					
TURCK type 5711	H= BLUE	L= WHITE	GND= BLACK	450 m	
Honeywell SDS 2022					
TURCK type 531	H= BLACK	L= WHITE	GND= BROWN	200 m	

Example types of cables used to connect the CAN network.

For overall distances to cover of ≤200 m and networks with a maximum of 6 nodes (a typical example: 1 DDC + 5 devices), a simple **3 x 0.75 mm²** shielded cable may be used.

As shown in Table 6.2 → 43, the CAN connection requires a CAN bus cable with 3 wires. If the available cable has more than 3 coloured wires, use the wires with the colours indicated in 6.2 → 43 and cut the remaining ones.

The ROBUR NETBUS cable is available as an accessory (see Section 8 → 58).

> CONNECTION PROCEDURE

Instructions for the specific operations to be carried out for the connection of the CAN bus cable follow:

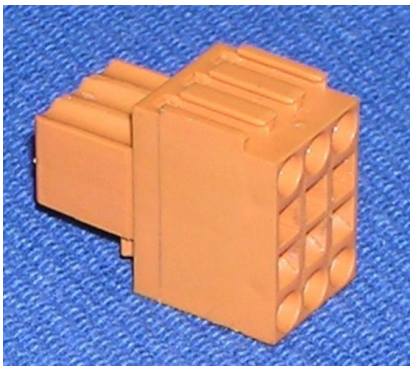
- Step A: connect the CAN-BUS cable to the CCI/DDC.
- Step B: connect the CAN-BUS cable to the appliance.

The two steps must done in both cases illustrated in Figure 6.17 → 48 (wiring diagram for 1 DDC connected to a single appliance) and Figure 6.18 → 49 (wiring diagram for 1 DDC connected to multiple appliances).

Step A: connect the CAN-BUS cable to the CCI/DDC

The CAN bus cable connects to the specific orange connector supplied with the DDC, as shown in Figure 6.12 → 44.

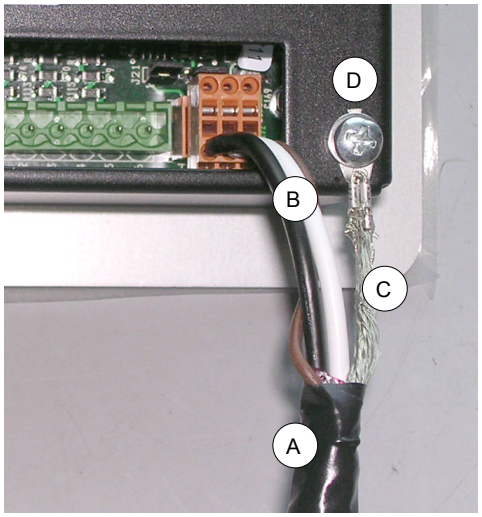
Figure 6.12



Orange connector for CAN-BUS connection to CCI/DDC (supplied with CCI/DDC).

The DDC is equipped with jumpers that must be moved in order to take on the configurations of *terminal node* and *intermediate node* (Figure 6.14 → 45). The DDC is supplied with the jumpers CLOSED (detail "A" Figure 6.14 → 45).

Figure 6.13 – Connection from CAN BUS to connector P8



LEGEND

A	Insulating tape to protect board/shield
B	CAN BUS cable wires
C	CAN bus cable shield
D	terminal and screw for fixing

Connection detail of cable CAN BUS.

To connect a CAN BUS cable to a DDC, proceed as follows (references in Figure 6.14 → 45):

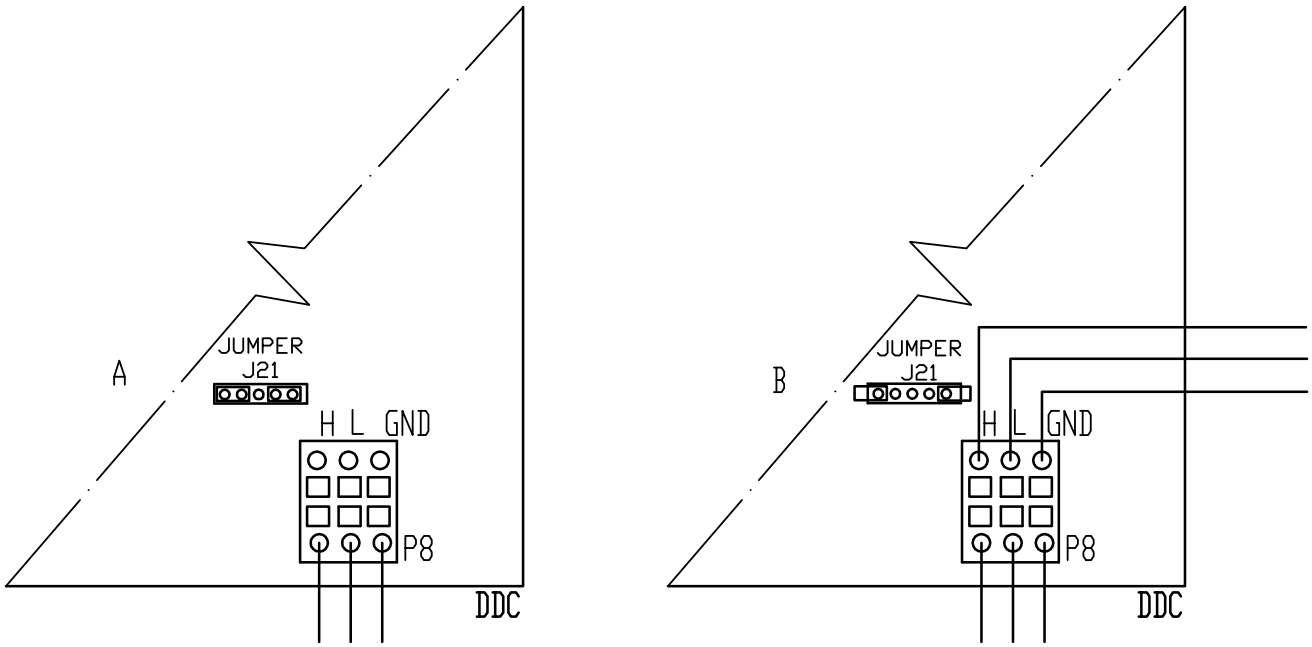
You will need: DDC not powered up. Necessary equipment and materials.

1. Depending on the type of node being configured, set the DDC's jumpers as shown in detail "A" or detail "B" in the figure. If necessary, open the DDC's back panel (4 bolts); after the jumpers have been correctly positioned, close the cover again and retighten the 4 bolts;

► if the DDC is an **intermediate node** on the network (with no. 6 wires in the orange connector): set the jumpers as shown in detail "B" of the figure: Jumpers OPEN;

► if the DDC is a **terminal node** on the network (with no. 3 wires in the orange connector): set the jumpers as shown in detail "A" of the figure: Jumpers CLOSED.

Figure 6.14 – detail wires and jumpers J21 - terminal/intermediate node CCI/DDC



LEGEND

DDC	CCI/DDC
J21	Jumper CAN-BUS in CCI/DDC board
A	detail case "terminal node" (3 wires; J21=jumper "closed")
B	detail case "intermediate node" (6 wires; J21=jumper "open")
H,L,GND	data signal wires

Detail terminal and intermediate node: jumpers position J21: "closed" - "open".

2. Prepare the orange connector (remove from envelope).
3. Cut a length of cable, long enough to allow it to be installed without kinking.
4. Having chosen one end of the length of cable, remove the sheath from a length of approximately 70-80 mm, taking care not to cut the wires contained inside, the shielding (metallic shield and/or aluminium sheet) and, if present, the bare connector in contact with the shield and the wires contained within.
5. Roll the shielding and connect it to a 4-mm eyelet terminal, as illustrated in Figure 6.13 → 44, details C and D. Now proceed as follows:
6. Connect the three coloured wires to the orange connector, as shown in detail "A" in the figure. Observe the terminal markings L, H, GND (on the DDC at the base of the socket "P8") which are given both in Table 6.2 → 43, and in the figure:

► if the DDC is an **intermediate node** on the network, also complete step "7";

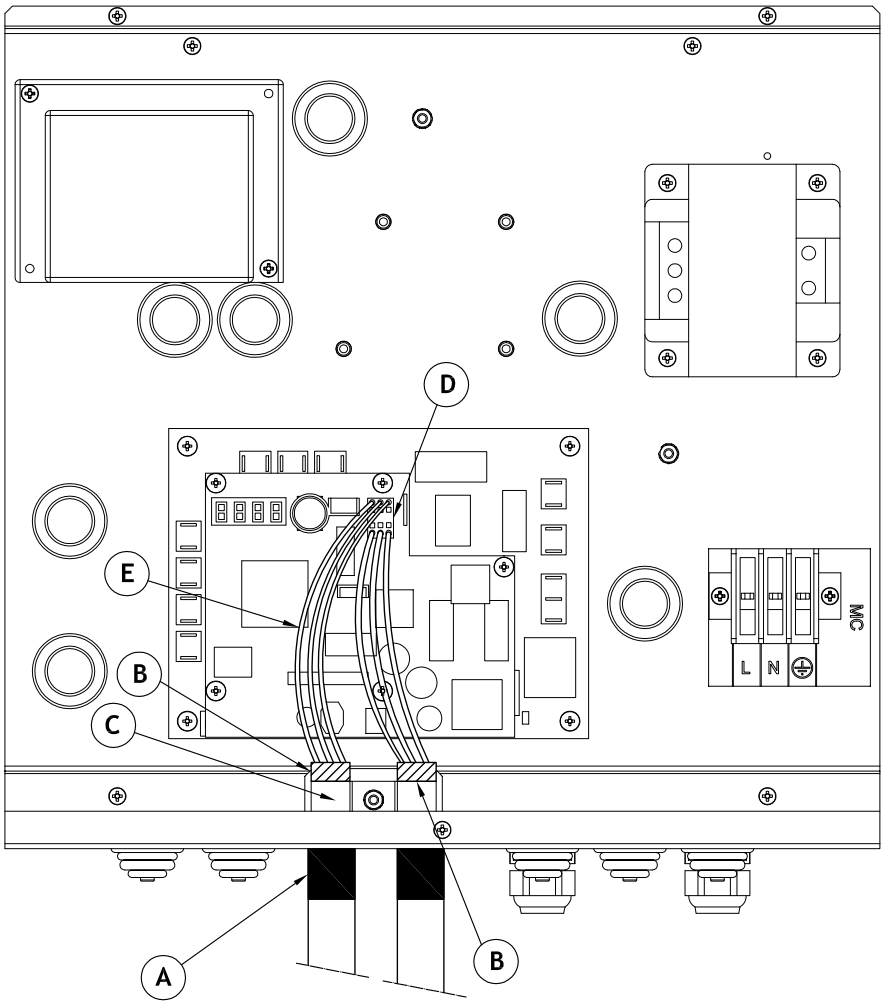
► if the DDC is a **terminal node**, skip directly to step "8".

7. **Intermediate nodes only**: repeat the operations from step "1" to step "4" for the other length of CAN bus cable required. Now proceed with step "5" and, to connect the cable to orange connector, refer to detail "B" in the figure. Then proceed to point "8".
8. Fit the orange connector, with the wires attached, first through the slot in the DDC's cover and then into the socket on the DDC itself.
9. Use the rear cover bolts located near the CAN BUS socket to secure the 4-mm eyelet (or 2 eyelets) (detail D, Figure 6.13 → 44). The cable should be secured against pulling out.

Step B: connect the CAN-BUS cable to the appliance

The CAN BUS cable must be connected to the orange socket on the machine's on-board controller (see detail "D" in Figure 6.15 → 46).

Figure 6.15 – Connection of CAN BUS cable to connector P8 on controller AY10



LEGEND
example of connection of 2 CAN BUS cables (the appliance is an intermediate node)

A	insulating tape to protect board/screen
B	CAN BUS cable shielding
C	cable bracket (for 2 CAN BUS cables)
D	orange connector for CAN BUS cable terminals
E	wires (no. 6) of CAN BUS cables

Detail of cabling of CAN BUS cable to controller AY10.

To connect the CAN BUS cable to the DDC, proceed as follows (references in Figure 6.15 → 46):

You will need: appliance not powered up. Necessary equipment and materials.

1. Remove the front panel of the appliance and the cover of the electrical panel.
2. Cut a length of cable, long enough to allow it to be installed without kinking.
3. Having chosen one end of the length of cable, remove the sheath from a length of approximately 70-80 mm, taking care not to cut the wires contained inside, the shielding (metallic shield and/or aluminium sheet) and, if present, the bare connector in contact with the shield and the wires contained within.
4. If the cable is too thin to be held in place in the cable holder bracket (detail C), make it thicker by wrapping insulating tape around it on the sheath in the area adjacent to the stripped part (to an approximate diameter of 12-13 mm).
5. Pull back the shielding in the sheathe; apply electrician's tape to the end of the shielding as pulled back (detail A).
6. Pull the orange connector (detail D) out of socket "P8" on the controller.
7. Connect the three coloured wires to the orange connector, as shown in detail "A" in Figure 6.16 → 47. Observe the terminal markings L, H, GND (on the board at the base of the socket "P8") which are given both in Table 6.2 → 43, and in Figure 6.16 → 47:

► if the appliance is an **intermediate node** on the network, also complete step 8;

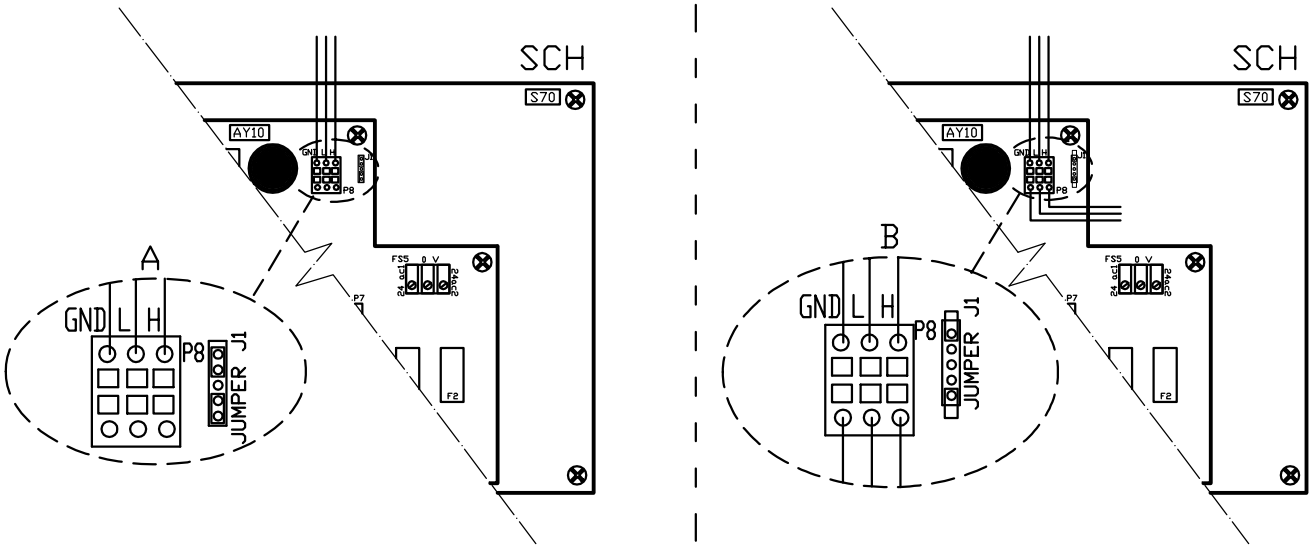
► if the appliance is a **terminal node**, skip directly to step 9.

8. **Intermediate nodes only**: repeat the operations from point 2 to point 5 for the other length of CAN bus cable required. Now proceed with step 7 and, to connect the cable to connector P8, refer to detail "B" in Figure 6.16 → 47. Then proceed to point 9.
9. Fit the orange connector, with wires attached, into the P8 socket on the board.
10. Fix the CAN BUS cable (or two cables, according to the type of node being connected) to the cable fixing bracket so that the rolled-back sheathing makes solid contact with the metal bracket. The cable should be secured against pulling out.
11. Now, depending on the type of node being configured, set the jumpers on the appliance's controller as shown in detail "A" or detail "B" in Figure 6.16 → 47. Proceed as follows:

► If the appliance is an **intermediate node** on the network (with no. 6 wires in the orange connector): set the jumpers as shown in detail "B" of the figure: Jumpers OPEN.

► If the appliance is a **terminal node** on the network (with no. 3 wires in the orange connector): set the jumpers as shown in detail "A" of the figure: Jumpers CLOSED.

Figure 6.16 – detail of wires and jumpers J1 - appliance terminal/intermediate node



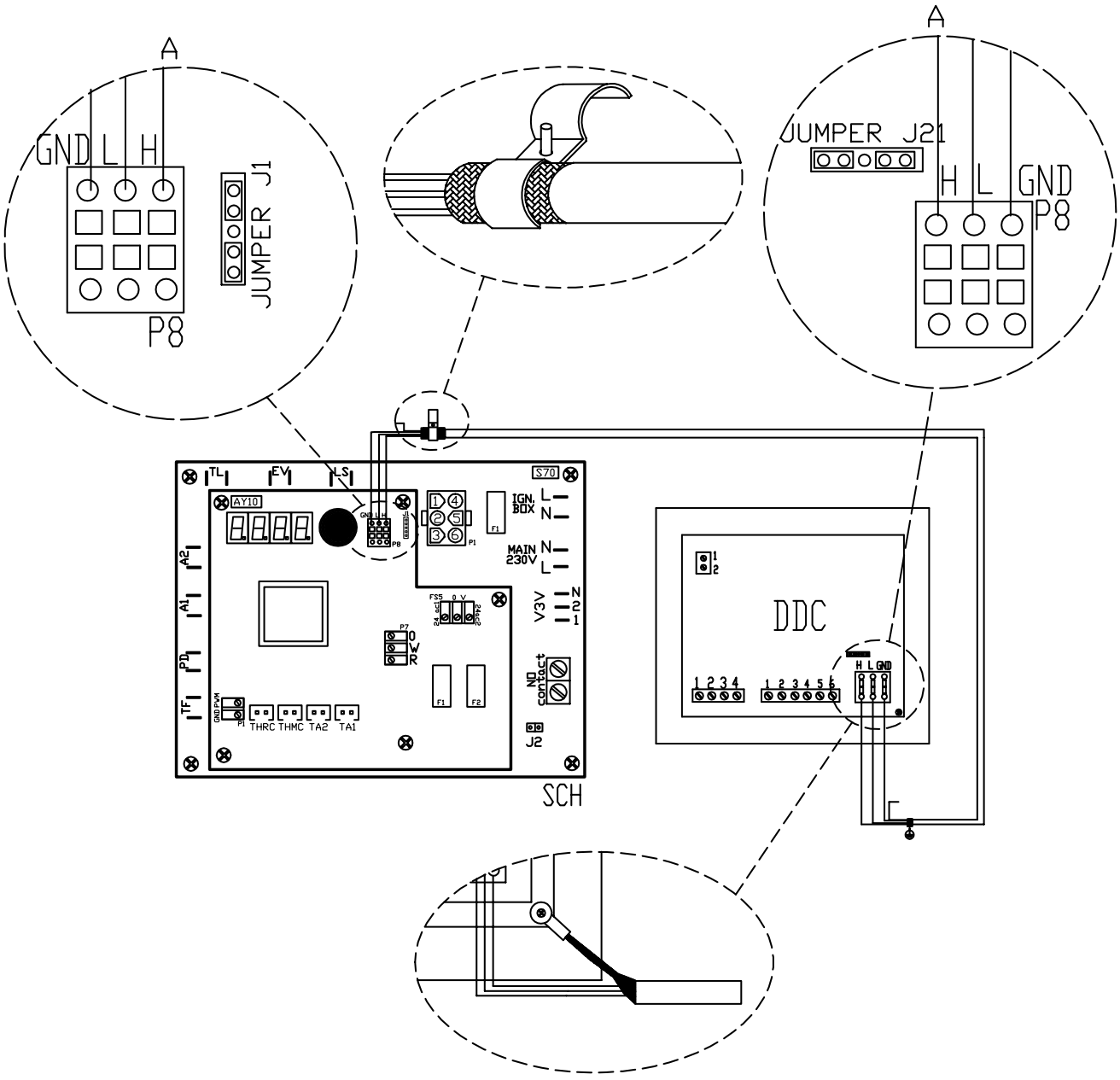
LEGEND

SCH	controller (AY10+S70)	A	detail of "terminal node" case (3 wires; J1=jumper "closed")
J1	CAN BUS jumper on AY10 controller	B	detail of "intermediate node" case (6 wires; J1=jumper "open")
		H,L,GND	data signal wires

Detail of terminal and intermediate node, jumper position J1: "closed" - "open".

12. Now close the electrical panel and refit the front panel of the appliance.

Figure 6.17 – CAN BUS connection for single appliance systems

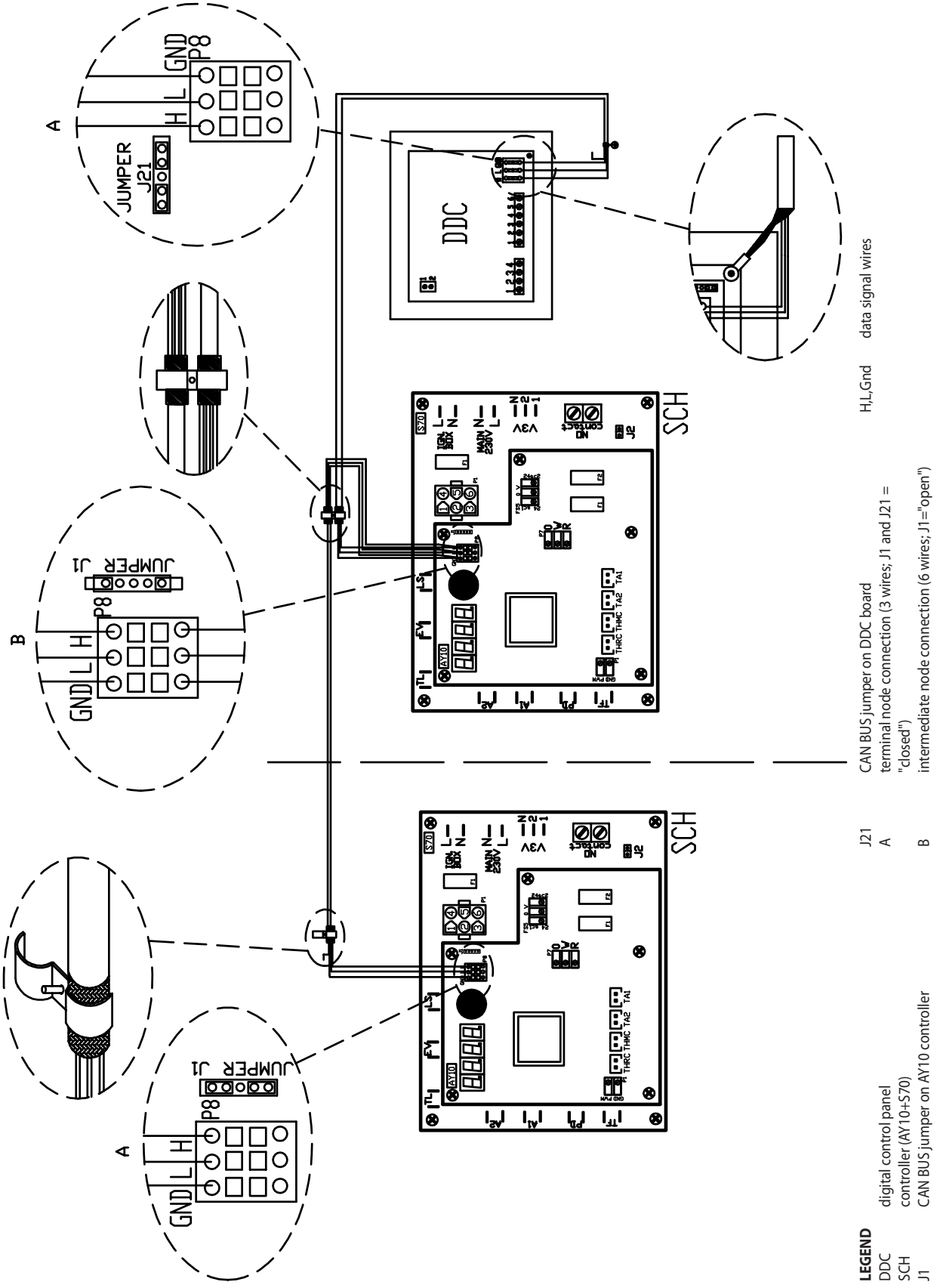


LEGEND

DDC	digital control panel
SCH	controller (AY10+S70)
J1	CAN BUS jumper on AY10 controller
J21	CAN BUS jumper on DDC board
A	terminal node connection (3 wires; J1 and J21 = "closed")
H,L,GND	data signal wires

CAN BUS cable connection between DDC and one appliance.

Figure 6.18 – CAN BUS connection for multiple appliance systems



CAN BUS cable connection between 1 DDC and multiple appliances.

7 INITIAL ACTIVATION AND MAINTENANCE

In this section you will find the following information:

- Indications required by the authorized Robur Technical Assistance Centre (TAC) in order to carry out the entire procedure of first start-up of the appliance (see Paragraph 7.1 → 50);
- Indications regarding maintenance operations of the appliance (Paragraph 7.2 → 53): general information and warnings; general indications regarding checks, controls and cleaning.
- Instruction for the Robur TAC or gas type conversion (Paragraph 7.3 → 54).

Before proceeding with the operations described in this section, the installation technician concerned is invited to read Paragraph 3.1 → 7. in regard to switching the appliance on and off, refer to Paragraph 4.1 → 13. If the appliance is connected to a DDC (and the DDC is in controller mode), for the phases of activation and deactivation of the appliance it is necessary to refer to the two manuals dedicated to the DDC itself.

7.1 PROCEDURE FOR FIRST START UP

The initial activation procedure is composed of the following (main) steps.
Step 1: preliminary verification of plant compliance.
Step 2: verification/regulation of combustion parameters and first ignition.
Step 3: regulation of plant operating parameters.

The entire procedure for the initial activation of the appliance must only carried out by an authorised Robur Technical Assistance Centre (TAC). The product's guarantee may be void if the procedure is not carried out by a Robur TAC.

Before leaving the factory, the appliance has been thoroughly tested.

Step 1: preliminary verification of plant compliance

The Robur TAC technician must:

- Check that the whole installation has been realized in accordance with its design, following the manufacturer's instructions and respecting current legislation. The design must have been drawn up by a professional specifier.
- Check personally that all of the connections (hydraulic/gas and electrical) of the appliance (and of the Direct Digital Controller, if connected to the appliance) have been made correctly.
- Check that the installation is actually compliant as per the Declaration of Conformity provided by the installer to the owner.

The Declaration of Conformity CERTIFIES that the installation is compliant with current regulations. This Declaration is a **mandatory** document and as such it must be provided by the installer to the owner.

- Check that the water pressure and flow in the hydraulic circuit and the static gas supply network pressure are correct, as indicated by the manufacturer.
- Check that the electrical power supply is 230V 50Hz
- Check that the air/fumes pipes are properly connected.
- Check that the fumes condensate discharge is properly installed.
- Check that the safety clearances have been observed, as shown in Figure 5.1 → 19.

If all the conditions listed above exist, the TAC can proceed with the operations, performing the "initial activation" of the appliance.
If any non-compliant elements arise during the initial verification, the TAC may choose not to proceed with the operation of "initial activation".
In this case, the Robur TAC technician must:

- Report the user/installer of any installation anomaly.
- Report the user/installer of any situation that is potentially hazardous for the appliance and for people.
- Report of any missing documentation relevant to the installation.
- According to the reports made, advise any corrective action to be taken at the installer's care in order to proceed with the "first start up".

It is the responsibility of the user/installation technician to carry out any corrective measures on the plant indicated by the TAC. Following such corrective measures performed by the installation technician, the TAC will assess the plant again. At this point, if, in the opinion of the TAC, safety and compliance conditions exist, the TAC must carry out the "initial activation".

Plant situations that are hazardous for people and for the appliance. If one of the following hazardous situations arises, the TAC must not carry out the "initial activation":

- appliance installed in improper configuration (e.g.: type B in closed and insufficiently ventilated area);
- appliance installed close to combustible substances or surfaces or in any case in conditions of bad accessibility or not allowing safe maintenance operations;

- control of switching on and off of the appliance not via the DDC but via the external switch connecting the appliance to the power supply mains ("GS", fitted by the electrical installation technician on a suitable panel);
- damages or failures of the appliance due to transportation or installation;
- smell of gas due to probable leaks from the plant itself and in any case all situations that are due to non-compliant plants, considered (after on-site evaluations) potentially hazardous.

Plant anomalies. If any of the following situations exists, the authorized technician may carry out the "first start up" at his choice, but the appliance must be left off until the anomalies are removed:

- installations (not potentially hazardous) not carried out according to sound workmanship practices, installations (not potentially hazardous) not complying with current national and local regulations;
- installations (not potentially hazardous) not carried out according to good workmanship practices, not complying with the instructions provided by the manufacturer;
- installations that can cause operational troubles on the appliance.

Step 2: verification/regulation of combustion parameters and first ignition

During the initial activation procedure, the combustion parameters must be checked and set ONLY by a Robur TAC. In this stage, NEITHER the user NOR the installation technician is authorised to perform such operations, and in so doing may invalidate the guarantee of the appliance.

The appliance is delivered already regulated for the type of gas requested. Anyway, the combustion parameters must ALWAYS be checked and set during the first start up.

The type of gas for which the appliance is set is given on the sticker on the internal panel and on the appliance's original packaging.

To check and set the combustion parameters, proceed as follows, with reference to Figures 7.1 → 52 and 7.2 → 52 and Table 7.1 → 53.

You will need: appliance not powered up: master power switch and gas cock set to OFF. outer front panel (H) removed. Necessary equipment and materials. DDC (if installed) already connected electrically.

1. Open the internal panel (E) by undoing its bolts.
2. Open the plant gas supply valve to the appliance and make sure that there is no smell of gas (indicating possible leaks).

In case of gas leaks, go back over Step 1 above and restore the system to compliancy.

3. Once you are sure there are no gas leaks, close the gas cock.

Now check the static and dynamic mains gas pressure: if the system has multiple appliances, this check (steps "4" to "10") need only be done once, so long as it is done with the appliance furthest from the mains connection; for the other appliances, skip directly from step "3" to step "12".

4. Undo the bolt sealing the inlet gas pressure socket (D).
5. Connect the manometer to the gas intake (mains pressure).
6. Open the gas valve.
7. Read the value of the **static network pressure** on the manometer and check that the value read is equal to that stated in Table 5.2 → 24 (with tollerance ±15%).
8. Close the master power switch (GS) on the external electrical panel.
9. Switch the appliance on. Wait for the appliance to stabilise (3 minutes from switching on) and then proceed to step "10".

If the appliance does not switch on, remove the side panel (N), remove the cap (L) and use a flathead screwdriver through hole (G) to turn the flow regulator screw 3 turns counterclockwise ; reinstall the cap (L) and repeat step "9".

10. Read the **dynamic mains pressure** on the pressure gauge and check that the value is in the range specified at step "7". Now switch the appliance off.

If the dynamic network pressure does not corresponde to the value stated in Table 5.2 → 24 (with tollerance ±15%), write down the fault and, at the end of the procedure, notify the installer/user. Received the notify, the user must not operate the appliance until the fault has been solved and the manufacturer's specifications are met (see Step 1 once again).

11. Restore the appliance by screwing the gas intake seal screw back in.
12. Close the appliance's internal panel (E).
13. Fit a combustion products probe in one of the points provided fro this purpose on the external fumes equipment.
14. Switch the appliance on and wait for it to stabilise (3 minutes).
15. With reference to Table 7.1 → 53 and the fumes analyser reading, check that the CO_2 content percentage of the combustion products is within ±0,2 of the characteristic value for the gas being used.
16. If the value is in the correct range, go to step "17". Otherwise, remove the side panel (N) and follow the instructions given in steps "25" and "26", including the note, in the procedure given in Paragraph 7.3 → 54.
17. Enter menu 2 and execute action "23": timed forcing of the appliance to minimum power (8.0 kW). **The procedure to run the actions of menu 2 is specified in this Paragraph "*Step 2*"**.

18. With reference to Table 7.1 → 53 and the fumes analyser reading, check that the difference between the CO_2 percentage observed in step "15" and the current reading corresponds to the $_{delta\ CO}2$ characteristic of the gas being used.

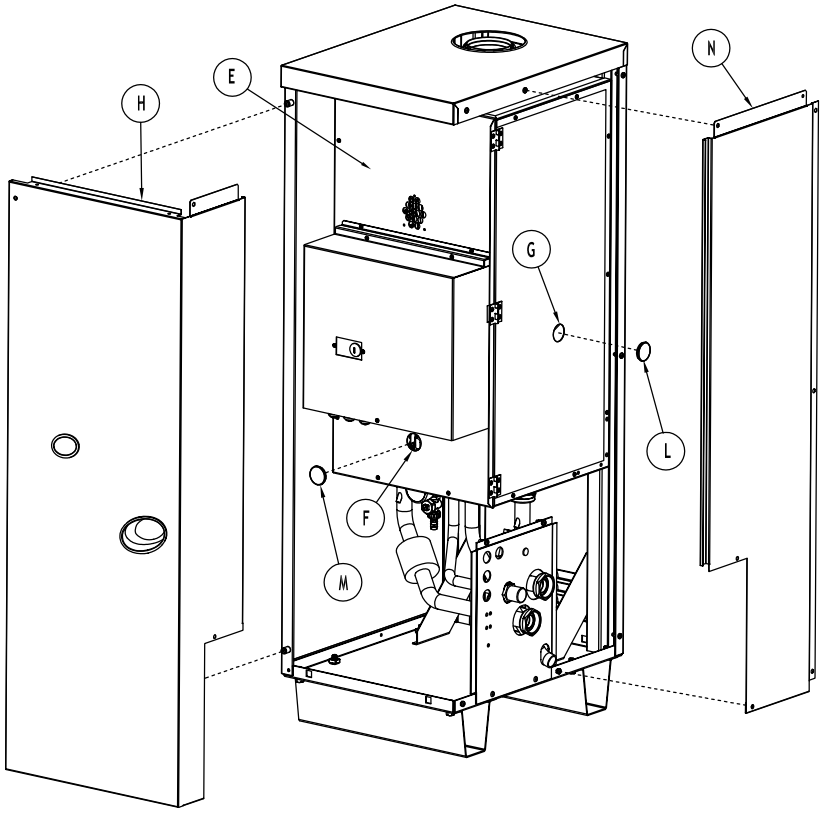
Example: having set, in step "15", a CO_2 content of 9.5% for G20 gas, at step "18" the reading should be 9.0% (=9.5%-0.5%).

19. If the difference satisfies the $_{delta\ CO}2$ requirement, go to the next step. Otherwise, follow the instructions given in steps "30" and "35", including the note, in the procedure given in Paragraph 7.3 → 54.
20. Enter menu 2 and execute action "25": forced stop to cancel the preceding forced operation and return to the initial operational configuration.

After 30 minutes of operation the appliance automatically cancels the preceding forced power mode. To anticipate this timing, select and execute action "25" in menu 2.

21. Switch off and completely restore the appliance.

Figure 7.1 – Checking and adjusting the combustion parameters

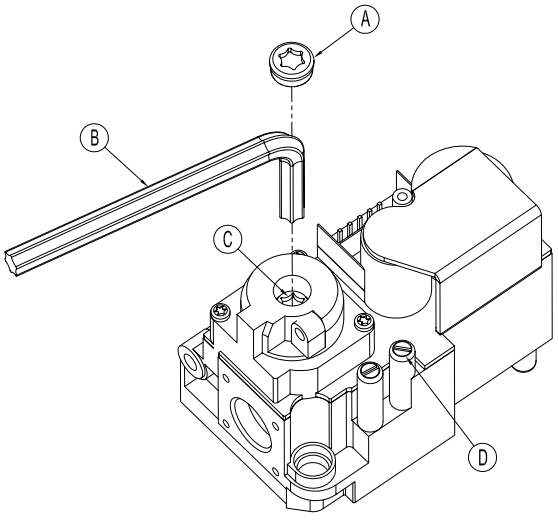


LEGEND

E	front panel interior
F	access hole for OFFSET regulator
G	access hole for flow rate regulator
H	front panel exterior
L	access plug for flow rate regulator
M	access plug for OFFSET regulator
N	external side panel

Procedure for checking and adjusting the combustion parameters.

Figure 7.2 – Gas valve



LEGEND

A	Cap
B	Torx wrench TX40
C	CO2 adjuster screw
D	Mains gas pressure fitting

Gas valve Honeywell VK 4115V

Table 7.1 – Gas nozzles and content of CO2

Gas type		G20	G25	G25.1	G27	G2.350	G30	LPG	G31
Nozzle code	-	176	179	178	178	-	177	177	177
Nozzle diameter	mm	6.20	7,30	7,60	7,60	-	4.45	4.45	4.45
Parameter value "45"	-	0	0	0	0	0	1	1	0
CO2 content	%	9.4	9.4	10,7	9,35	9,15	12,4	11.4	10.6
Delta CO2 between Max and Min potential	%	0,5	0,5	0,5	0,45	0.35	0,9	0,9	0,4

In the first start-up stage, on the display of the controller of the appliance (and/or on the display of the DDC, if connected), an operating code might be visualized. If the operating code is generated by the controller of the appliance, see the list of codes in Table 9.1 → 59; if the operating code is generated by the DDC, see the list of codes given in the "installation technician manual - manual 1" of the DDC (supplied with the unit).

Successful first start-up ONLY certifies the correct operation of the appliance (and of the DDC, if connected). It does NOT certify that the plant complies with current regulations.

OPERATIONS IN MENU 2

► **FORCING TO MINIMUM POWER (ACTION "23"):**

You will need: the display showing "2.20" (see point "3" of procedure "HOW TO ACCESS THE MENUS" - Paragraph "4.3 → 15").

1. Turn the knob clockwise until the display shows parameter "2.23".
2. Press the knob to display the flashing force to minimum power request: "P_L1".
3. Press the knob again to execute the forcing. The request stops flashing, and the display shows "2.23" again. The forcing operation has been performed.
4. To exit the menu, turn the knob clockwise until "2.E" displays, and press it to return to the menu selection: "2.".
5. To exit the menu selection, turn the knob clockwise until "E" displays, and press it to exit.

► **FORCING TO MAXIMUM POWER (ACTION "24"):**

You will need: the display showing "2.20" (see point "3" of procedure "HOW TO ACCESS THE MENUS" - Paragraph "4.3 → 15").

1. Turn the knob clockwise until the display shows parameter: "2.24".
2. Press the knob to display the flashing force to minimum power request: " P_H1".
3. Press the knob again to execute the forcing. The request stops flashing, and the display shows "2.24" again. The forcing operation has been performed.
4. To exit the menu, turn the knob clockwise until "2.E" displays, and press it to return to the menu selection: "2.".
5. To exit the menu selection, turn the knob clockwise until "E" displays, and press it to exit.

► **CANCELLING POWER FORCING (ACTION "25"):**

You will need: the display showing "2.20" (see point "3" of procedure "HOW TO ACCESS THE MENUS" - Paragraph "4.3 → 15").

1. Turn the knob clockwise until the display shows parameter: "2.25".
2. Press the knob to display the flashing cancel forcing request: "UnF1".
3. Press the knob again to execute the cancel operation. The request stops flashing, and the display shows "2.25" again. The cancel operation has been performed.
4. To exit the menu, turn the knob clockwise until "2.E" displays, and press it to return to the menu selection: "2.".
5. To exit the menu selection, turn the knob clockwise until "E" displays, and press it to exit.

Step 3: regulation of plant operating parameters

Regulation of operating parameters of the plant occurs via the controller (see Paragraph 5.9 → 29) or via the DDC (if connected).

In this phase it may be necessary to check the settings of parameters "156", "180" and "182", which are closely linked to the system requirements (see instructions "SPECIAL PARAMETER SETTINGS" in Paragraph 5.9 → 29).

If the appliance is connected to a Direct Digital Controller (DDC), for operations regarding the regulation of plant operating parameters according to the user's requirements, refer to the DDC's manual (final user manual - manual 2) supplied with the unit.

7.2 MAINTENANCE

Correct maintenance prevents problems, guarantees maximum operating efficiency of the appliance and allows running costs to be contained.

The maintenance operations described in this paragraph must be performed exclusively by the serviceman in charge of the plant or by an authorized CAT Robur.

Any operation that regards internal components of units of the appliance must be carried out by an authorized Robur Technical Assistance Centre (TAC), according to the instructions supplied by the manufacturer.

The "efficiency check" and every other "check and maintenance operation" (see Table 7.2 → 54 and 7.3 → 54), **must be performed with a frequency in agreement to current law** or, if more restrictive, in respect of what requested by the planner (builder of the system) or by the manufacturer of the unit.

The liability of CHECKING THE EFFICIENCY AS A FUNCTION OF THE SYSTEM, OF THE FUEL IN USE AND OF THE THERMAL POWER, to be carried out with the purpose of containing the energy consumption, **is in charge to the responsable of the system**.

Before carrying out any operation on the appliance, switch it off via the appropriate on/off command (or via the DDC, if connected and in controller mode) and wait for the shutdown cycle to terminate. When the appliance is off, disconnect it from the gas and electricity mains, bearing in mind the antifreeze settings, via the external circuit breaker (GS) and the gas valve.

GUIDELINES FOR THE PREVENTIVE MAINTENACE OPERATIONS

In Table 7.2 → 54 are reported the **guidelines** for the preventive maintenance operations.

If the unit is subject to particularly heavy duty (for example in process plants or in other conditions of continuous operation), **these maintenance operations must be more frequent**.

Table 7.2

GUIDELINES FOR THE PREVENTIVE MAINTENACE OPERATIONS					
Check of the unit	**GAHP-A**	**GAHP-GS/WS**	**AY**	**ACF**	**GAHP-AR**
Visually check of the general condition of the unit and of its air heat exchanger. (1)	√		√	√	√
Check the correct operation of the device used for monitoring the water flow	√	√	√	√	√
Check the % value of CO_2	√	√	√		
check gas pressure to the burners				√	√
Check that the condensate discharge is clean (clear the condensate discharge hole of any blockages) [If necessary, frequency of the maintenace operation must be increased]	√	√	√		
Replace the belts after 6 years or 12,000 hours of operation	√	√		√	√
Check/restore the pressure of the primary hydronic circuit			√		
Check/restore the air pressure inside of the expansion vessel of the primary hydronic circuit			√		
Check every CCI or DDC(2)	**DDC o CCI**				
Check that the plant is able to achive the setpoint temperature	√				
Download the hystorical events	√				

1 - It is suggested the cleaning of the air heat exchanger once every 4 years [the optimal frequency of this operation is in any case a consequence of the installation site].
2 - Check that the plant is able to achive the setpoint temperature.

ORDINARY SCHEDULED MAINTENANCE

Perform the following operations at least **once every 2 years**.

If the unit is subject to particularly heavy duty (for example in process plants or in other conditions of continuous operation), **these maintenance operations must be more frequent**.

Table 7.3

SCHEDULED MAINTENANCE OPERATIONS	TO BE PERFORMED AT LEAST ONE EVERY TWO YEARS				
Check of the unit	**GAHP-A**	**GAHP-GS/WS**	**AY**	**ACF**	**GAHP-AR**
Clean the combustion chamber	√*	√*	√	√	√*
Clean the burner	√*	√*	√	√	√*
Clean the electrodes of ignition and flame sensing	√	√	√	√	√
Check that the condensate discharge is clean (clear the condensate discharge hole of any blockages)	√	√	√		
Replace the silicone gasket			√		

*Only in case the analysis of combustion products is non-compliant

In Section 5 → 18 are reported **suggestions related to the hydraulic plant**.

7.3 CHANGE OF GAS TYPE

The following procedure must be done by a Robur TAC or professionally qualified technician.

To convert the appliance to operation with a different type of gas from that indicated on the sticker on the appliance's internal panel and the packaging, proceed as follows.

You will need: appliance not powered up: master power switch and gas cock set to OFF. provided envelope containing the spare nozzles and sticker. Necessary equipment and materials.

The appliance must be fitted with the sticker (in the conversion kit) giving the specifications of the new gas type in replacement of the existing sticker. The sticker must bear the markings required by UNI EN 483 (par. *8.2.3*).

- CHECK THE NOZZLE DIAMETER.

Refer to Table 7.1 → 53 and Figure 7.3 → 57; if the diameter of the nozzle to be used with the gas with which the appliance is to be operated corresponds to the diameter of the existing nozzle, skip directly to the step checking the value of parameter "45": step "8" onwards.
If on the other hand the diameter is different from that of the existing nozzle, the latter must be replaced:

1. Remove the outer front panel (H - Figure 7.1 → 52) and open the internal panel (E - Figure 7.1 → 52) by undoing the screws securing it.
2. Undo the nut (A) connecting the gas pipe to the gas valve (C).
3. Slacken off the nut (B) connecting the gas pipe to the air/gas mixer (G).
4. Turn the gas pipe so as to enable access to the gas nozzle (D) inside the flanged union on the gas valve outlet (C).
5. Replace the nozzle (D).

Each nozzle is stamped with a code to identify it (see Table 7.1 → 53).

6. Restore the appliance making sure to reposition (and replace if damaged) the gaskets (E, F) affected by the procedure.

During the procedure a number of broken seals must be restored and regulators sealed.

At this point, open the system gas cock and check for gas leaks at the two pipe unions (A, B); close the gas cock.

7. Close the appliance's internal panel (E).

- CHECK THE VALUE OF PARAMETER "45".

8. Turn on the master power switch (GS).
9. Enter menu 1 (accessible to everyone) and check the setting of parameter "45".
10. **If the value of the parameter "45" doesn't match** the value specified for the type of gas with which the appliance is intended to operate(see Table 7.1 → 53), enter in menu 4 of the electronic board and set the correct value for parameter "45" (see Table 7.1 → 53). **To enter menu 4 and make the required changes, refer to the instructions "Hydraulic parameter settings" in Paragraph 5.9** → 29.

If the setting of parameter "45" coincides with the value specified for the type of gas with which the appliance is to be operated, skip step "10".

- CHECK/ADJUST THE COMBUSTION PARAMETERS.

Refer to Figures 7.1 → 52 and 7.2 → 52, and Table 7.1 → 53.

You will need: appliance not powered up: master power switch and gas cock set to OFF. external front panel (H) and side panel (N) removed. Necessary equipment and materials. DDC (if installed) already connected electrically.

Now check the static and dynamic mains gas pressure: if the system has multiple appliances, this check (steps "11" to "18") need only be done once, so long as it is done with the appliance furthest from the mains connection; for the other appliances, skip directly from step "11" to step "20".

11. Open the internal panel (E) by undoing its bolts.
12. Undo the bolt sealing the inlet gas pressure socket (Figure 7.2 → 52 - detail D).
13. Connect the manometer to the gas intake (mains pressure).
14. Open the gas valve.
15. Read the value of the **static network pressure** on the manometer and check that the value read is equal to that stated in Table 5.2 → 24 (with tollerance ±15%).
16. Close the master power switch (GS) on the external electrical panel.
17. Switch the appliance on. Wait for the appliance to stabilise (3 minutes from switching on) and then proceed to step "18".

If the appliance fails to switch on, remove the access cap (L) on the flow regulator and use a flathead screwdriver through hole (G) to turn the regulator screw 3 turns counterclockwise. Replace the cap (L).

18. Read the **dynamic mains pressure** on the pressure gauge and check that the value is in the range specified at step "15". Now switch the appliance off.

If the dynamic pressure does not corresponde to the value stated in Table 5.2 → 24 (with tollerance ±15%), perform the necessary checks (see *Step 1* del Paragrafo 7.1 → 50) and solve the fault.

19. Restore the appliance by screwing the gas intake seal screw back in.
20. Close the appliance's internal panel (E).
21. Fit a combustion products probe in one of the points provided fro this purpose on the external fumes equipment.
22. Switch the appliance on and wait for it to stabilise (3 minutes).
23. With reference to Table 7.1 → 53 and the fumes analyser reading, check that the CO_2 content percentage of the combustion products is within ±0,2 of the characteristic value for the gas being used.
24. If the value is in the correct range, go to step "27"; otherwise proceed as follows:
25. remove the access cap (L) on the flow regulator and use a flathead screwdriver through the hole (G) to adjust the flow regulator so that the value falls in the correct CO_2 content range.
26. Reinstall the cap (L).

1 full turn of the flow regulator screw reduces (clockwise) or increases (counterclockwise) the percentage of CO_2 by approximately 0.1%.

27. Enter menu 2 of the electronic board and execute action "23": timed forcing of the appliance to minimum power (8.0 kW). **The procedure to run the actions of menu 2 is specified in the Paragraph 7.1** → 50, **at the end of "Step 2"**.
28. With reference to Table 7.1 → 53 and the fumes analyser reading, check that the difference between the CO_2 percentage observed in step "15" and the current reading corresponds to the *delta* CO_2characteristic of the gas being used.

Example: having set, in step "23", a CO_2 content of 9.5% for G20 gas, at step "28" the reading should be 9.0% (=9.5%-0.5%).

29. If the difference satisfies the *delta* CO_2 requirement, go to step "34", otherwise proceed as follows:
30. Open the access (F) to the OFFSET regulator, which is part of the gas valve, by removing the access cap (M) on the internal panel (E).
31. Open the internal panel (E) and, using a Torx TX40 wrench (B) remove the cap (A) on the OFFSET regulator (C). Close the internal panel (E).
32. Through hole (F) on panel (E), use a Torx TX40 wrench (B) on the OFFSET regulator to achieve a value of CO_2 content whose value relative to the value red at step "23" satisfies the requirement of the Table regarding the characteristic *delta* CO_2 for the gas being used (see example above and **observe the following instructions**):

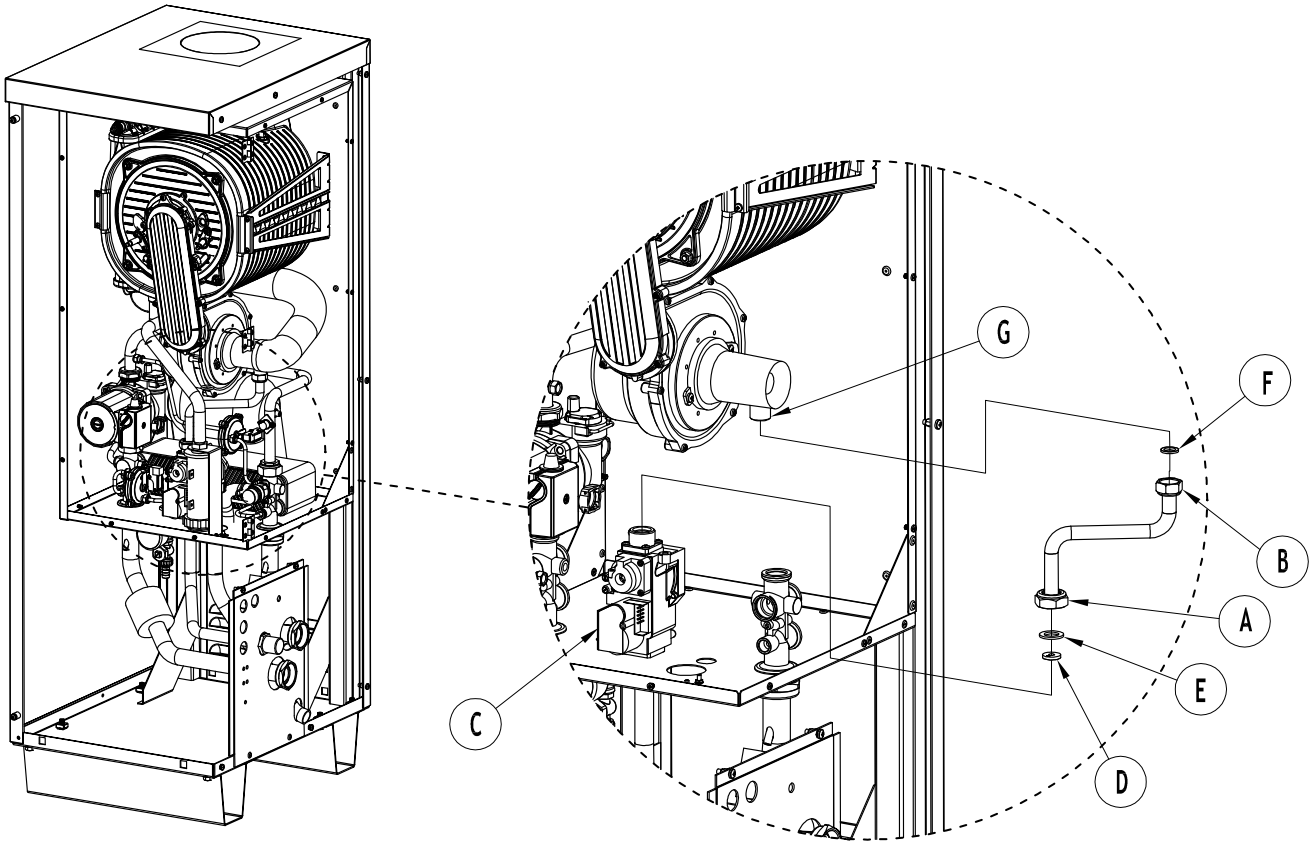
1/8 turn of the OFFSET regulator screw reduces (counterclockwise) or increases (clockwise) the CO_2 content by approximately 0.1%.

33. Once the correct CO_2 content has been achieved, open the internal panel (E) and restore the cap (A), close the panel (E) and reinstall the cap (M).
34. Enter menu 2 and execute action "24": timed forcing of the appliance to maximum power (34.9 kW).
35. Check that the CO_2 content percentage of the combustion products is within ±0.2 of the characteristic value for the gas being used. If this condition is not met, repeat the procedure from step "25", otherwise proceed with the next step.
36. Enter menu 2 and execute action "25": forced stop to cancel the preceding forced operation and return to the initial operational configuration.

After 30 minutes of operation the appliance automatically cancels the preceding forced power mode. To anticipate this timing, select and execute action "25" in menu 2.

37. Switch off and completely restore the appliance.

Figure 7.3 – Gas type conversion



LEGEND

A	tube/valve connection nut
B	tube/air-gas mixer connection nut
C	gas valve
D	gas nozzle
E	gasket (large) on tube/valve fitting
F	gasket (small) on tube/air-gas mixer fitting
G	air-gas mixer

Details of gas changeover procedure.

8 ACCESSORIES

This section contains a list of the accessories that are available for the installation and use of the appliance. To order these accessories, contact Robur S.p.A. on +39.035.888111.

Table 8.1 – AVAILABLE ACCESSORIES

ACCESSORIES FOR INSTALLATION TECHNICIAN			
Name	**Description**	**Code**	**Notes**
ANTIVIBRATION MOUNT kit FOR BASE	Kit of 4 non-adjustable anti-vibration feet for installation on the beams of the base.	ONTV008	For multiple units ONLY. For the mount positioning spacings, see the dimensional drawings.
PLANT ELECTRICAL PUMP	Centrifugal pump for the circulation of water in the hydraulic plant	OPMP000	For cold and hot water
HYDRAULIC SEPARATOR	Separator for balancing hydraulic circuits; with automatic air vent, drain valve and insulation.	OSPR000	Maximum water flow rate 15 $m^{3/h.}$
WATER/GLYCOL MIX	Glycol water solution (water/glycol mix 50+50) for hot/cold hydraulic systems.	OGLC007	10 liters tank (50%÷50%). Glycol water solution for machine internal circuit.
CONDENSATE PUMP	Pump for the condensate obtained from combustion products.	OPMP006	Handles up to 20 units.
Direct Digital Controller (DDC)	Provides remote control of one or more units.	OCRM007	No. 1 DDC per a maximum of 16 units in the same installation. NB: with multiple units, the DDC is standard supply.
RB100	Controller for handling sliding temperatures and remote ACS production.	ODSP001	Can be used in combination with the DDC.
WISE (Web Invisible Service Employee)	Communications system for remote handling, control and supervision of installation.	ODSP000	Can be used in combination with the DDC. The WISE unit has an integral antenna; 1 RS232 serial cable; 1 cable with telephone jack; 1 CD-ROM.
Robur "NETBUS" CAN BUS CABLE	Cable for data communication networks: for network connection between DDC and appliance.	OCVO008	Maximum length: 450 m (for details, see the electrical connections section).

List of appliance accessories.

9 OPERATING CODES/TROUBLESHOOTING

9.1 OVERVIEW AND OPERATING CODES/TROUBLESHOOTING

If, during the operation of the appliance, the display of the controller of the appliance (or also of the display of the Direct Digital Controller, if connected) signals an operating code, it is necessary to:

- ► make a note of the indications shown on the display;
- ► consult the (specific) list of machine operating codes.

For the operating codes generated by the controller of the appliance, refer to Table 9.1 → 59. If the appliance is connected to a DDC, a list of the operating codes generated by the DDC is provided in the DDC's manual (see "installation technician manual - manual 1").

- ► carry out the instructions contained in it scrupulously (contact your Authorised Robur Technical Assistance Centre when instructed to do so).

If, after performing these operations, the appliance does not start, first carry out the following simple checks:

- ► ensure that the external disconnecting switch fitted by the electrical installation technician on a suitable panel (see Section 6 → 32) is set to ON;
- ► check that the consent switches (see Paragraph 6.3 → 39) or the DDC (if connected and in controller mode) are set for operation of the appliance;
- ► check that the gas supply valve is open;
- ► determine that no further indications are given on the display.

At this point, if the appliance still does not start:

- ► refrain from proceeding by trial and error; instead request the direct assistance of an authorised Robur Technical Assistance Centre (TAC), informing it of the Machine Code that has arisen;
- ► disconnect the appliance from the gas and electricity supply, cutting off the gas supply by means of the appropriate tap and electrical power via the external master power switch. Wait for the TAC staff to arrive.

For how to reset the machine operating code with the on-board controller, refer to Paragraph 4.3 → 15.

We list below the operating codes generated by the appliance's controller (firmware version 3.106). The following codes can also be displayed by the DDC, if connected.

Table 9.1 – TABLE OF OPERATING CODES generated by the electronic board (firmware version 3.106)

CODES	DESCRIPTION	TRIP CONDITIONS	RESET METHOD
E 100	FLAME RESET FAULTY	The flame control unit reset circuit is faulty.	Contact authorised Technical Assistance.
E 101	LIMIT THERMOSTAT	The limit thermostat is open. This only happens if the flame controller is on and the gas solenoid valve is excited (the thermostat is connected in series with the solenoid valve power supply).	Contact authorised Technical Assistance.
u 102	FUMES THERMOSTAT AND/ OR INTERNAL EXCHANGER THERMOSTAT	The fumes thermostat and/or the internal exchanger thermostat are interrupted.	Contact authorised Technical Assistance.
E 102	FUMES THERMOSTAT AND/ OR INTERNAL EXCHANGER THERMOSTAT	"u 102" persistent for 1 hour.	Contact authorised Technical Assistance.
E 103	HEATING CONTROLLER NOT PRESENT	The auxiliary controller (S70) is not present.	Contact authorised Technical Assistance.
E 105	HIGH AMBIENT TEMPERATURE	The ambient temperature is HIGH. This only happens when the appliance is operating.	Automatic (on termination of originating event).
E 106	LOW AMBIENT TEMPERATURE	The ambient temperature is LOW. This only happens when the appliance is operating.	Automatic (on termination of originating event).
u 107	WATER PRESSURE SWITCH (HOT ONLY CIRCUIT)	The system water differential pressure switch is closed while the appliance is running in cooling mode. This only happens when the appliance is installed in a "hot/cold" system.	Automatic (on termination of originating event).
u 112	FLAME CONTROLLER FAULT	The burner does not light.	Automatic when the flame controller attempts ignition again (solenoid valve excited - maximum 4 attempts); or after 5 minutes of persistence: in this case, ignition has failed and a new event has occurred after "u112" was reset (run checks).
E 112	ARREST OF FLAME CONTROL UNIT	Flame controller arrested - failure to ignite burner: all possible attempts to ignite the burner have failed.	Reset via the controller, menu 2, parameter 20 (or via DDC). If the code persists, contact authorised TAC.
u 127	MACHINE INTERNAL CIRCUIT WATER PRESSURE SWITCH	Lo stato del pressostato non corrisponde allo stato del circolatore acqua del circuito interno della macchina.	Automatico ed avviene se si ha corrispondenza di stato tra il circolatore e il pressostato differenziale.
E 127	MACHINE INTERNAL CIRCUIT WATER PRESSURE SWITCH	"u 127" persistent for 10 minutes.	Carry out appropriate checks. Reset via the controller, menu 2, parameter 21 (or via DDC). If the code persists, contact authorised TAC.

CODES	DESCRIPTION	TRIP CONDITIONS	RESET METHOD
E 128	FLAME CONTROLLER ON AND ARRESTED	The flame controller is arrested (E_12) but the gas solenoid valve is excited. In this case the flame controller is de-excited.	Reset via DDC (or via the controller, menu 2, parameter 20). If the code persists, contact authorised TAC.
u 129	GAS SOLENOID VALVE WITHOUT ELECTRICAL POWER	Gas solenoid valve is off for 5 seconds (with flame controller on).	Automatic, when at least of the following conditions obtains (and only if the "E 101" condition has not been forced): flame controller off, or solenoid valve excited.
E 129	GAS SOLENOID VALVE WITHOUT ELECTRICAL POWER	The gas solenoid valve has been off for more than 10 minutes (with the flame controller on), or "E 101" is keeping the flame controller on. Or also in the case that, with the flame off (but flame controller on) "E 101" obtains when generation of "u/E" is enabled.	Reset via the controller, menu 2, parameter 21 (or via DDC). If the code persists, contact authorised TAC.
E 135	DELIVERY WATER TEMPERATURE PROBE FAULT (MACHINE CIRCUIT)	The delivery water probe on the internal circuit (machine circuit) is faulty.	Contact authorised Technical Assistance.
u 136	MODULATING BLOWER FAULT	The blower speed is out of range.	Reset occurs automatically 20 minutes after the operating code is generated.
E 136	MODULATING BLOWER FAULT	u_36 code generated three times in 1 hour of operation.	Contact authorised Technical Assistance.
u 175	SYSTEM CIRCUIT WATER PRESSURE SWITCH - Insufficient water flow	The system circuit water circulator is on and the system circuit water differential pressure switch is open.	Automatico ed avviene se il circolatore si spegne, oppure se il pressostato differenziale si chiude.
E 175	SYSTEM CIRCUIT WATER PRESSURE SWITCH - Insufficient water flow	Event u_175 has been generated 5 times since the appliance was powered up, or code u_175 has been active for 1 hour.	Carry out appropriate checks. Reset via the controller, menu 2, parameter 21 (or via DDC). If the code persists, contact authorised TAC.
E 176	OUTPUT WATER (SYSTEM) TEMPERATURE PROBE FAULT	Fault (interruption or short circuit) on outlet system water temperature sensor.	Reset via the controller, menu 2, parameter 21 (or via DDC). If the code persists, contact authorised TAC.
E 177	INPUT WATER (SYSTEM) TEMPERATURE PROBE FAULT	Fault (interruption or short circuit) on inlet system water temperature sensor.	Reset via the controller, menu 2, parameter 21 (or via DDC). If the code persists, contact authorised TAC.
u 178	DELIVERY WATER TEMPERATURE (MACHINE CIRCUIT) HIGH	The water temperature on the internal circuit (machine circuit) is too high.	Automatic (on termination of originating event).
u 179	DEFROST FUNCTION ACTIVATED	The temperature of the water has reached values which could result in icing. In such cases, to prevent the appliance arresting, the defrost function may activate only the system circuit circulator or also the flame controller.	The defrost function is de-activated automatically when the flame controller switches off and/or the circulator switches off. These switch off when the water temperature has reached the values required to ensure operation of he appliance. The defrost function can also be de-activated manually via the controller, menu 4, parameter 163.
u 80	INCOMPLETE PARAMETERS	Incomplete functional parameters (menus 3, 4 and 5).	The code persists until operating parameters are entered and completed. Contact authorised TAC.
E 80	INVALID PARAMETERS	Invalid parameters (menu 6) or damage to parameter memory.	Reset occurs automatically when correct parameters are entered. If the code persists, contact authorised TAC: if the memory is damaged, the controller must be replaced.
u 81; u 82	"BANK 1" AND "BANK 2" PARAMETERS: INVALID	Bank 1 data invalid - Bank 2 data invalid: in both cases, one of the two parameter memory pages contains invalid values.	Automatic (on termination of originating event).
E 81; E 82	"BANK 1" AND "BANK 2" PARAMETERS: INVALID	Bank 1 data invalid - Bank 2 data invalid: the program has failed to copy the data from the correct page to the other page.	Contact authorised Technical Assistance.
E 84	FAULTY TRANSFORMER CONNECTION OR 24 V AC FUSES	Danneggiamento dei 2 fusibili di ingresso 24-0-24 Vac oppure interruzione del filo centrale dell'alimentazione 24-0-24 Vac verso la scheda	Check fuses and 24-0-24 V AC electrical power connections on the controller. Reset via the controller, menu 2, parameter 21 (or via DDC). If the code persists or returns, contact authorised TAC.
E 85	INCORRECT MODULE TYPES (from menu 6)	The set module type (from menu 6) does not correspond to the one managed by the controller.	Contact authorised Technical Assistance.
E 86; E 87; E 88 ; E 89	MEMORY TEST UNSUCCESSFUL	Processor error.	Contact authorised Technical Assistance.
E 90	AMBIENT TEMPERATURE SENSOR DEFECTIVE	Interruption or short circuit of ambient temperature sensor.	Contact authorised Technical Assistance.
E 91	CONTROLLER DEFECTIVE	Numero seriale di scheda assente e/o codice di versione hardware assente e/o chiave di criptazione assente o errata; oppure i dati di calibrazione sono assenti o inconsistenti.	Contact authorised Technical Assistance.

Robur mission

Robur is dedicated to dynamic progression
in research, development and promotion
of safe, environmentally-friendly, energy-efficiency products,
through the commitment and caring
of its employees and partners.

Revisione: J Codice: D-LBR531 14 MCM SDC 007 10/03/2014

ROBUR®
caring for the environment

Robur Spa
tecnologie avanzate
per la climatizzazione
Via Parigi 4/6
24040 Verdellino/Zingonia (Bg) Italy
T +39 035 888111 F +39 035 884165
www.robur.it robur@robur.it

AFAQ ISO 9001 2000 VERSION ISO 14001